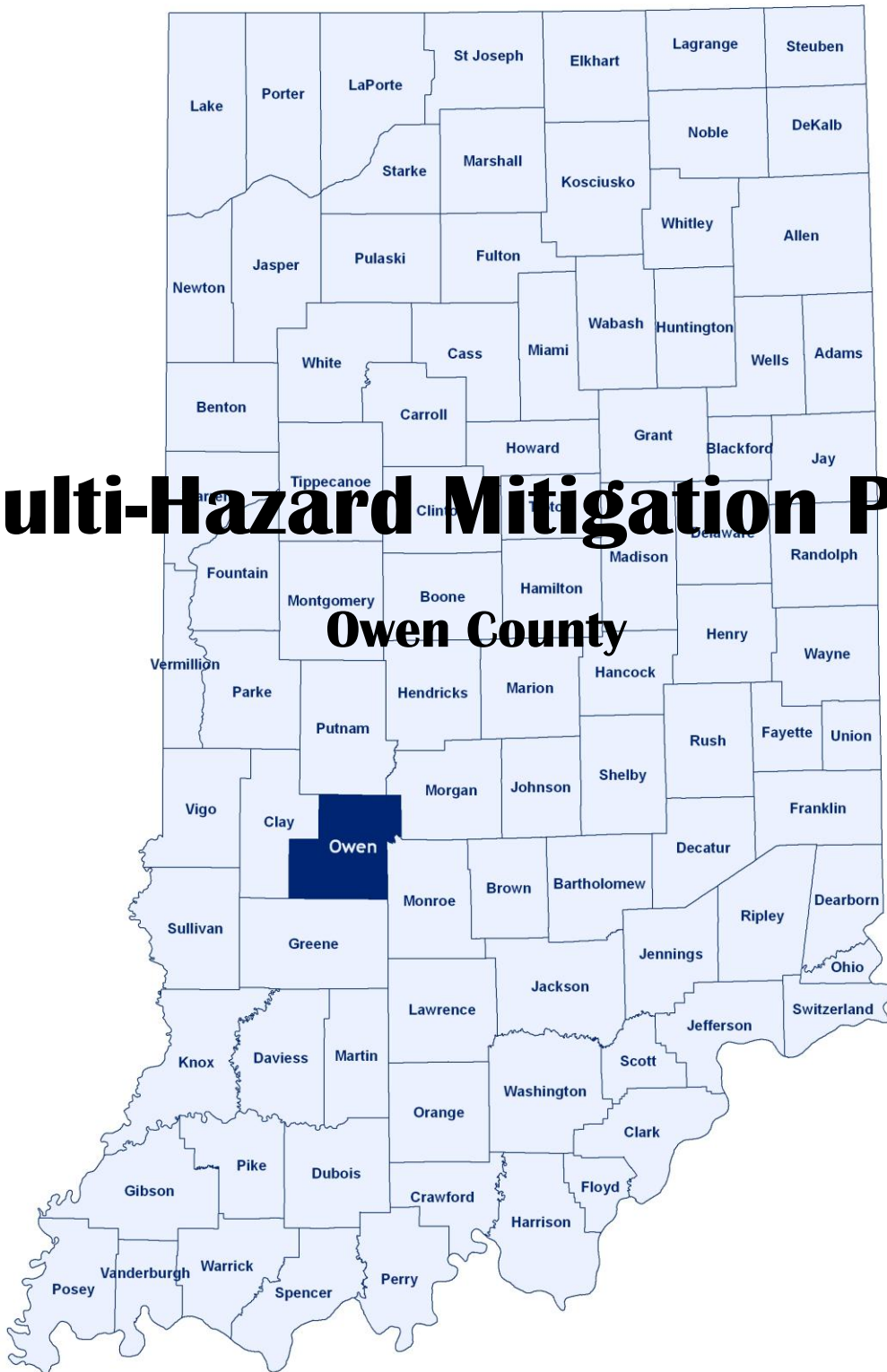


Multi-Hazard Mitigation Plan

Owen County



Owen County
Emergency
Management Agency
60 South Main Street
Spencer, IN 47460



The Polis Center
IUPUI
1200 Waterway Boulevard
Suite 100
Indianapolis, IN 46202

Hazard Mitigation Plan

Owen County, Indiana

Adoption Date: -- January 29, 2010 --

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Section 1 - Public Planning Process

1.1 Narrative Description

Hazard Mitigation is defined as any sustained action to reduce or eliminate long-term risk to human life and property from hazards. The Federal Emergency Management Agency (FEMA) has made reducing hazards one of its primary goals; hazard mitigation planning and the subsequent implementation of resulting projects, measures, and policies is a primary mechanism in achieving FEMA's goal.

The Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). The development of a local government plan is a requirement in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs. In order for the National Flood Insurance Program (NFIP) communities to be eligible for future mitigation funds, they must adopt an MHMP.

The Polis Center and Owen County have joined efforts to develop this mitigation plan, realizing that the recognition of and the protection from hazards impacting the county and its residents contribute to future community and economic development. The team will continue to work together to develop and implement mitigation initiatives developed as part of this plan.

In recognition of the importance of planning in mitigation activities, FEMA created Hazards USA Multi-Hazard (HAZUS-MH), a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict the estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. The Indiana Department of Homeland Security has determined that HAZUS-MH should play a critical role in Indiana's risk assessments. The Polis Center (Polis) at Indiana University Purdue University Indianapolis (IUPUI) and the Indiana Geological Survey at Indiana University are assisting Owen County planning staff with performing the hazard risk assessment.

1.2 Planning Team Information

The Owen County Multi-Hazard Mitigation Planning Team is headed by Jack White, who is also the primary point of contact. Members of the planning team include representatives from various county departments, cities and towns, and public and private sectors. Table 1-1 identifies the planning team individuals and the organizations they represent.

Table 1-1: Multi-Hazard Mitigation Planning Team Members

| Name | Title | Organization | Jurisdiction |
|----------------|-------------------------------|--|-----------------|
| Pam Hageman | Technical Assistance Provider | Indiana Rural Community Assistance Program | Town of Spencer |
| Joe Heinmiller | Volunteer | Volunteer resident | Owen County |
| Vic Kinney | Volunteer | Volunteer resident | Owen County |
| Sheila Reeves | Office Manager | Health Department | Owen County |
| Denise Shaw | Director | Chamber of Commerce & Economic Development Corporation | Town of Spencer |
| Jack Simmerman | Volunteer | Volunteer resident | Town of Spencer |

| Name | Title | Organization | Jurisdiction |
|-------------|---------------------------|-----------------------------|-----------------|
| Jon Stantz | Vice President | Town Council | Town of Spencer |
| Jack White | Director | Emergency Management Agency | Owen County |
| Becky Welch | V.P. Gosport Town Council | Town Council | Gosport |

The Disaster Mitigation Act (DMA) planning regulations and guidance stress that planning team members must be active participants. The Owen County MHMP committee members were actively involved on the following components:

- Attending the MHMP meetings
- Providing available GIS data and historical hazard information
- Reviewing and providing comments on the draft plans
- Coordinating and participating in the public input process
- Coordinating the formal adoption of the plan by the county

An MHMP kickoff meeting was held at the Owen County Courthouse on January 13, 2009. Representatives of Owen attended the meeting. Dave Coats of The Polis Center explained the rationale behind the MHMP program and answered questions from the participants. He also provided an overview of HAZUS-MH and described the timeline and the process of the mitigation planning project. At the end of the meeting, Dave presented Owen County with a Memorandum of Understanding (MOU) for sharing data and information.

The Owen County Multi-Hazard Mitigation Planning Committee met on January 13, 2009, February 17, 2009, March 31, 2009, April 29, 2009, and June 18, 2009. These meetings were held in the Owen County Courthouse. Each meeting was approximately two hours in length. The meeting agendas, minutes, and attendance sheets are included in Appendix A. During these meetings, the planning team successfully identified critical facilities, reviewed hazard data and maps, identified and assessed the effectiveness of existing mitigation measures, established mitigation projects, and assisted with preparation of the public participation information.

1.3 Public Involvement in Planning Process

An effort was made to solicit public input during the planning process and a public meeting was held during the formation of the plan on March 31, 2009. Appendix A contains the agendas and minutes from the public meeting. Appendix B contains articles published by the local newspaper throughout the public input process.

1.4 Neighboring Community Involvement

The Owen County planning team invited participation from various representatives of county government, local city and town governments, community groups, local businesses, and universities. The team also invited participation from adjacent counties to obtain their involvement in the planning process. Details of neighboring stakeholders' involvement are summarized in Table 1-2.

Table 1-2: Neighboring Community Participation

| Person Participating | Neighboring Jurisdiction | Organization | Participation Description |
|----------------------|--------------------------|-----------------------------|--|
| Brian Husband | Clay County | Emergency Management Agency | Reviewed plan; commented and offered suggestions |
| Kim Hyten | Putnam County | Emergency Management Agency | Reviewed plan; commented and offered suggestions |
| Roger Axe | Greene County | Emergency Management Agency | Reviewed plan; commented and offered suggestions |

1.5 Review of Technical and Fiscal Resources

The MHMP planning team has identified representatives from key agencies to assist in the planning process. Technical data, reports, and studies were obtained from these agencies. The organizations and their contributions are summarized in Table 1-3.

Table 1-3: Key Agency Resources Provided

| Agency Name | Resources Provided |
|--|--|
| Indiana Department of Homeland Security | Provided repetitive loss information |
| Indiana Department of Natural Resources, Division of Water | Digital Flood maps and levee information |
| Indiana Geological Survey | GIS data, digital elevation models |
| FEMA | Earthquake liquefaction data |

1.6 Review of Existing Plans

Owen County and its associated local communities utilized a variety of planning documents to direct community development. These documents include land use plans, master plans, emergency response plans, municipal ordinances, and building codes. The MHMP planning process incorporated the existing natural hazard mitigation elements from previous planning efforts. Table 1-4 lists the plans, studies, reports, and ordinances used in the development of the plan.

Table 1-4: Planning Documents Used for MHMP Planning Process

| Author(s) | Year | Title | Description | Where Used |
|-------------------|------|--|---|----------------------|
| Titan Corporation | 2004 | Comprehensive Emergency Management Plan | Lists and prioritizes hazards and provides county information | Sections 1-5 |
| Owen County | 2003 | Zoning & Subdivision Control Ordinance | Provides county zoning information | Section 4; Section 5 |
| Town of Spencer | 2008 | Zoning Jurisdiction & Town of Spencer Corporate Boundaries | Provides county zoning information | Section 4; Section 5 |
| Town of Gosport | 2008 | Zoning Jurisdiction | Provides county zoning information | Section 4; Section 5 |
| PMSI | 2004 | Hazard Analysis Plan | Describes potential hazards for Owen County | Section 4 |

Section 2 - Jurisdiction Participation Information

The jurisdictions included in this multi-jurisdictional plan are listed in Table 2-1.

Table 2-1: Participating Jurisdictions

| Jurisdiction Name |
|-------------------|
| County of Owen |
| Town of Gosport |
| Town of Spencer |

2.1 Adoption by Local Governing Body

The draft plan was made available on June 18, 2009 to the planning team for review. Comments were then accepted. The Owen County hazard mitigation planning team presented and recommended the plan to Owen County Commissioners and Town Board members, who adopted it on January 29, 2010. Resolution adoptions are included in Appendix C of this plan.

2.2 Jurisdiction Participation

It is required that each jurisdiction participates in the planning process. Table 2-2 lists each jurisdiction and describes its participation in the construction of this plan.

Table 2-2: Jurisdiction Participation

| Jurisdiction Name | Participating Member | Participation Description |
|-------------------|----------------------|---------------------------------|
| Owen County | Jack White | Member, MHMP planning committee |
| Gosport | Becky Welch | Member, MHMP planning committee |
| Spencer | Jon Stantz | Member, MHMP planning committee |

All planning team members were involved in attending meetings, providing data and resources when possible, reviewing and commenting on the drafts, participating in the public input process, and coordinating the formal adoption of the plan by the county.

Section 3 - Jurisdiction Information

Owen County was named for Colonel Abraham Owen, who was an influential officer in the War of 1812's Battle of Tippecanoe; he lost his life in the battle. The county, organized in 1819, consists of 13 townships: Clay, Franklin, Harrison, Jackson, Jefferson, Jennings, Lafayette, Marion, Montgomery, Morgan, Taylor, Washington, and Wayne. Spencer is the county seat and the largest town with a population of 2,481.

Owen County is bounded by Clay County to the west, Greene County to the south, Monroe County to the east, Morgan County to the northeast, and Putnam County to the north.

*Sources: http://www.city-data.com/county/Owen_County-IN.html;
<http://www.countyhistory.com/owen/start.html>*

3.1 Topography

Owen County is located southwest of Indianapolis. Its rural landscape consists of 385 square miles of land and 2.7 square miles of water area. The population density is averagely dispersed at 59 people per square mile.

The county is characterized by southern Indiana's rolling hills and hardwood forests. There are several state parks in the area including Owen-Putnam State Forest, McCormick's Creek State Park, and Lieber State Park. Owen County's sources of water include aquifers, rivers, streams, springs, lakes, and ponds.

3.2 Climate

In Owen County, mid-summer temperatures can be excessively hot and the winter snowfall can vary greatly from one year to the next. Humidity averages 60% for the mid-afternoon and rises during the evening with dawn humidity around 80%. The possibility for sunshine is 70% during the summer and 40% during the winter. Rainfall is moderately heavy and averages 40 inches annually, falling mostly during the spring and summer months. The average seasonal snowfall is 25 inches. The prevailing wind is from the south-southwest at an average speed of 10 miles per hour.

Sources: <http://www.city-data.com/city/Spencer-Indiana.html>

3.3 Demographics

Owen County has a population of 22,398. According to STATS Indiana, from 1990–2000, Owen County experienced a population increase of 26.1%. The population is spread through 13 townships including Clay, Franklin, Harrison, Jackson, Jefferson, Jennings, Lafayette, Marion, Montgomery, Morgan, Taylor, Washington, and Wayne. The largest town in Owen County is Spencer which has a population of approximately 2,481. The breakdown of population by incorporated areas is included in Table 3-1.

Table 3-1: Population by Community

| Community | 2006 Population | % of County |
|-----------|-----------------|-------------|
| Gosport | 726 | 3.2% |
| Spencer | 2,481 | 11.1% |

Source: STATS Indiana, 2006

3.4 Economy

STATS Indiana reported for 2006 that 79.1% of the workforce in Owen County was employed in the private sector. The breakdown is included in Table 3-2. Manufacturing represents the largest sector, employing approximately 24.6% of the workforce and generating approximately 42.8% of the earnings. The 2006 annual per capita income in Owen County is \$24,922 compared to an Indiana average of \$32,288.

Table 3-2: Industrial Employment by Sector

| Industrial Sector | % of County Workforce (2006) |
|--|------------------------------|
| Agriculture, forestry, fishing, hunting, and mining | 7.7% |
| Construction | 7.2% |
| Manufacturing | 24.6% |
| Retail trade | 8.0% |
| Transportation, warehousing and utilities | 3.2% |
| Professional and technical | 2.4% |
| Arts, entertainment, recreation, accommodation and food services | 6.1% |
| Other services(except public administration) | 9.0% |
| Public administration | 12.4% |

Source: STATS Indiana, 2006

3.5 Industry

Owen County's major employers and number of employees are listed in Table 3-3. The largest employer is Boston Scientific, Inc, which was established in 1988 and has nearly 1400 employees. Cook Urological/Cook Medical is the second largest, with 535 full-time employees. Manufacturing is the largest industry in the county.

Table 3-3: Major Employers

| Manufacturing | | | | |
|--------------------------------|----------|-------------|-----------|------------------|
| Company Name | Location | Established | Employees | Type of Business |
| Boston Scientific, Inc. | Spencer | 1988 | 1400 | Medical Devices |
| Cook Urological / Cook Medical | Spencer | 1978 | 535 | Medical Devices |

Source: Owen County Chamber of Commerce, 2006

Commuter Patterns

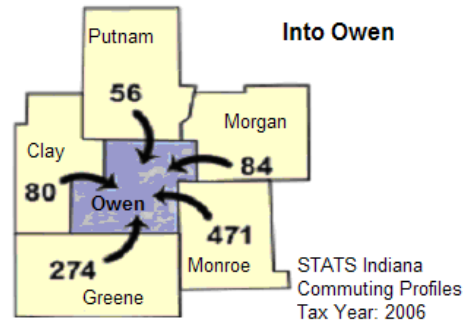
According to STATS Indiana information from 2006, Owen County has approximately 13,571 residents who are in the work force. Of these, approximately 8,092 work in the county. Roughly 5,479 residents commute outside the county for work and 1,177 non-residents commute into the county to work. Figure 3-1 depicts the commuting patterns into and out of the top five surrounding jurisdictions.

Figure 3-1: Commuter patterns into and out of Owen County

Top five counties sending workers INTO Owen County:

| | |
|-----------------------|--------------------|
| Monroe County | 471 |
| Greene County | 274 |
| Morgan County | 84 |
| Clay County | 80 |
| Putnam County | 56 |
| Total of above | 965 workers |

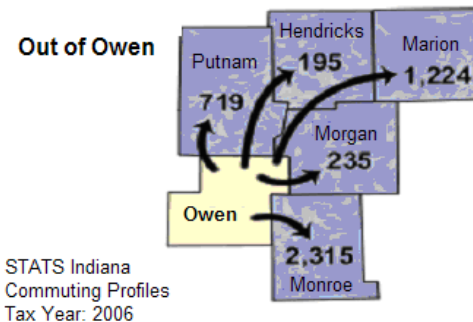
(10.4% of Owen County work force)



Top five counties receiving workers FROM Owen County:

| | |
|-----------------------|----------------------|
| Monroe County | 2,315 |
| Marion County | 1,224 |
| Putnam County | 719 |
| Morgan County | 235 |
| Hendricks County | 195 |
| Total of above | 4,688 workers |

(34.5% of Owen County labor force)



3.6 Land Use and Development Trends

Owen County and the Town of Spencer are currently working to update their comprehensive land use plans. The county was last updated in 2003 and is zoned primarily as agricultural. The town was last updated in 1978 and is primarily residential.

Owen County's Economic Development Office predicts that a small industrial park and downtown revitalization will emerge from the new plan along with developments in tourism and natural resource preservation (increased river park activities).

Source: Owen County Economic Development Office

3.7 Major Lakes, Rivers, and Watersheds

Owen County is the point of origin of Mill Creek. Two sets of falls meet on Mill Creek, creating a stunning waterfall, Cataract Fall, that plunges 20 feet. It is the largest waterfall in Indiana. Other significant rivers include the White River, which intersects the county diagonally, and Eel River, which runs through the southwest corner. The only significant lake is Cagles Mill Lake located in the northwest corner.

Source: <http://www.cataractfalls.com/>

A list of 14-digit Hydrologic Unit Code (HUC) watersheds is included in Table 3-4.

Table 3-4: Watersheds

| Watershed Name | HUC Code |
|---|----------------|
| Butler Creek-Butler Branch | 05120201180070 |
| Indian Creek (Owen) | 05120201180080 |
| White River-Gosport | 05120201180090 |
| White River-Big Creek/Limestone Creek | 05120202020010 |
| Mill Creek-Little Mill Creek | 05120202020020 |
| White River-Fall Creek/McCormicks Creek | 05120202020030 |
| White River-Spencer | 05120202020040 |
| Rattlesnake Creek | 05120202020050 |
| White River-Mills Creek/Goose Creek | 05120202020060 |
| Raccoon Creek-Little Raccoon Creek | 05120202020070 |
| Raccoon Creek-Lick Creek | 05120202020080 |
| White River-Jack Creek | 05120202020090 |
| East Fork Fish Creek | 05120202020100 |
| West Fork Fish Creek | 05120202020110 |
| Fish Creek-Sand Lick Creek | 05120202020120 |
| Fish Creek-West Fork | 05120202020130 |
| Fish Creek-Mack Creek | 05120202020140 |
| White River-Bucknell Creek/Goose Creek | 05120202020150 |
| Richland Creek-Little Richland Creek | 05120202040010 |
| Rhodes Creek | 05120203060110 |
| Mill Creek-Sand Branch | 05120203060130 |
| Brush Creek (Owen) | 05120203060140 |
| Mill Creek-upstream Cagles Mill Lake | 05120203060150 |
| Doe Creek-Ferguson Branch | 05120203060160 |
| Mill Creek-Cagle Mill Lake | 05120203060170 |
| Eel River-Slate/Ahlemeyer Branches | 05120203070030 |
| Jordan Creek-Headwaters (Owen) | 05120203070050 |
| North Fork Jordan Creek | 05120203070060 |
| Jordan Creek-Lower | 05120203070070 |
| Sixmile Creek-Sulphur Creek | 05120203080020 |
| Connelly Ditch-Headwaters | 05120203090050 |
| Eel River-White Oak Creek | 05120203090070 |
| Eel River-Muir Lake/Pond Creek | 05120203090080 |

| Watershed Name | HUC Code |
|---------------------------------------|-----------------|
| Lagoon Creek-Howesville Ditch | 05120203090090 |
| Lick Creek-West Fork Lick Creek | 05120203090100 |
| Lick Creek-Hauser Creek | 05120203090110 |
| Lick Creek-Need/Brush Creek-Eel River | 05120203090120 |

Source: U.S. Geological Survey HUC14 Watersheds, 2006

Section 4 - Risk Assessment

The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation must be based on sound risk assessment. A risk assessment involves quantifying the potential loss resulting from a disaster by assessing the vulnerability of buildings, infrastructure, and people. This assessment identifies the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of three components—hazard identification, vulnerability analysis, and risk analysis.

4.1 Hazard Identification/Profile

4.1.1 Existing Plans

To facilitate the planning process, pre-existing plans were used for this risk assessment section. These existing plans included Owen County Comprehensive Emergency Management Plan 2004 (CEMP) and Indiana digital flood maps.

4.1.2 Planning Team Hazard Rankings

During Meeting #2, which occurred on February 17, 2009, the planning team developed and ranked a list of hazards it felt affected each jurisdiction. Table 4-1 lists the jurisdictions and their respective hazard rankings (Ranking 1 being the highest concern).

Table 4-1: Hazard Rankings by Jurisdiction

| Jurisdiction | Hazard | | | | | | |
|--------------|----------|--------------|---------|--------------|------------|--------|-------------------|
| | Flooding | Thunderstorm | Tornado | Winter Storm | Earthquake | Hazmat | Dam/Levee Failure |
| Owen County | 2 | 3 | 1 | 4 | 5 | 6 | 7 |
| Spencer | 1 | 4 | 2 | 5 | 3 | 7 | 6 |
| Gospport | 4 | 2 | 1 | 5 | 3 | 7 | 6 |

4.1.3 National Hazard Records

In addition to these identified hazards, the MHMP planning committee reviewed the list of natural hazards prepared by FEMA. To assist the planning team, historical storm event data was compiled from the National Climatic Data Center (NCDC) <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll>.

NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather events.

The NCDC data included 224 reported events in Owen County between January 1, 1950 and October 31, 2008. A summary table of events related to each hazard type is included in the

hazard profile sections that follow. A full table listing all events, including additional details, is included as Appendix D. In addition to NCDC data, Storm Prediction Center (SPC) data associated with tornadoes, strong winds, and hail were plotted using SPC recorded latitude and longitude. These events are plotted and included as Appendix E. NCDC hazards are listed in Table 4-2.

Table 4-2: Climatic Data Center Historical Hazards

| Hazard |
|----------------------|
| Tornadoes |
| Severe Thunderstorms |
| Drought/Extreme Heat |
| Winter Storms |
| Flood/Flash flood |

4.1.4 Hazard Ranking Methodology

Based on planning team input, national datasets, and existing plans Table 4-3 lists the hazards Owen County will address in this all hazards mitigation plan. In addition, these hazards ranked the highest based on the Priority Risk Index discussed in section 4.1.5.

Table 4-3: Planning Team Hazard List

| Hazard |
|-------------------------------------|
| Tornado |
| Flooding and Dam/Levee Failure |
| Severe Thunderstorm/High Winds/Hail |
| Severe Winter Storms |
| Earthquake |
| Hazardous Materials Release |
| Ground Failure |

4.1.5 Calculated Priority Risk Index

The next step involved a vulnerability analysis in which each hazard was assigned a likelihood rating based on the criteria and methods described in the following table. Table 4-4 displays the probability of the future occurrence ranking. This ranking was based on previous history and the definition of hazard. Using the definitions given, the likelihood of future events is "Quantified" which results in the classification within one of the four "Ranges" of likelihood.

Table 4-4: Future Occurrence Ranking

| Probability | Characteristics |
|--------------------------|---|
| 4 - <i>Highly Likely</i> | Event is probable within the calendar year. Event has up to 1 in 1 year chance of occurring. (1/1=100%) History of events is greater than 33% likely per year. |
| 3 - <i>Likely</i> | Event is probable within the next three years. Event has up to 1 in 3 years chance of occurring. (1/3=33%) History of events is greater than 20% but less than or equal to 33% likely per year. |
| 2 - <i>Possible</i> | Event is probable within the next five years. Event has up to 1 in 5 years chance of occurring. (1/5=20%) History of events is greater than 10% but less than or equal to 20% likely per year. |
| 1 - <i>Unlikely</i> | Event is possible within the next ten years. Event has up to 1 in 10 years chance of occurring. (1/10=10%) History of events is less than or equal to 10% likely per year. |

Next, the magnitude of the hazard's effect is considered according to the severity associated with past events of the hazard. Table 4-5 gives four classifications of Magnitude/Severity.

Table 4-5: Hazard Magnitude

| Magnitude/Severity | Characteristics |
|---------------------------|--|
| 4 - <i>Catastrophic</i> | Multiple deaths. Complete shutdown of facilities for 30 or more days. More than 50% of property is severely damaged. |
| 3 - <i>Critical</i> | Injuries and/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least 14 days. More than 25% of property is severely damaged. |
| 2 - <i>Limited</i> | Injuries and/or illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than seven days. More than 10% of property is severely damaged. |
| 1 - <i>Negligible</i> | Injuries and/or illnesses are treatable with first aid. Minor quality of life lost. Shutdown of critical facilities and services for 24 hours or less. Less than 10% of property is severely damaged. |

Warning Time and Duration are allotted four ranges each, as shown in the Table 4-6. Also indicated is the weighting factor for each of the four parts of the Calculated Priority Risk Index (CPRI). The Probability factor is weighted at .45, Magnitude/Severity at .30, Warning Time at .15, and Duration at .10. These weights of significance are used to assign relative importance to each of these factors when combined to generate the CPRI value.

Table 4-6: Calculated Priority Risk Index

| .45 Probability | .30 Magnitude/Severity | .15 Warning Time | .10 Duration |
|------------------------|-------------------------------|-------------------------|-----------------------|
| 4 - Highly Likely | 4 - Catastrophic | 4 - Less Than 6 Hours | 4 - More Than 1 Week |
| 3 - Likely | 3 - Critical | 3 - 6-12 Hours | 3 - Less Than 1 Week |
| 2 - Possible | 2 - Limited | 2 - 12-24 Hours | 2 - Less Than 1 Day |
| 1 - Unlikely | 1 - Negligible | 1 - 24+ Hours | 1 - Less Than 6 Hours |

Table 4-7 identifies the CPRI for each hazard facing Owen County.

Table 4-7: Owen County Hazards (CPRI)

| Hazard | Probability | Magnitude/ Severity | Warning Time | Duration | Priority Risk Index |
|---|--------------------|--------------------------------|-------------------------|---------------------|--------------------------------|
| Tornado | 4 Highly Likely | 3 Critical | 4 <6 Hours | 1 Less Than 6 Hours | 3.4 |
| Flooding | 4 Highly Likely | 2 Limited | 3 6-12 Hours | 3 Less Than 1 Week | 3.15 |
| Thunderstorms/ High Winds/Hail/ Lightning | 4 Highly Likely | 2 Limited | 4 <6 Hours | 1 Less Than 6 Hours | 3.1 |
| Winter Storms | 4 Highly Likely | 1 Negligible | 3 6-12 Hours | 3 Less Than 1 Week | 2.85 |
| Earthquake | 2 Possible | 2 Limited | 4 <6 Hours | 2 Less Than 1 Day | 2.3 |
| Hazardous Material Release | 2 Possible | 2 Limited | 4 <6 Hours | 2 Less Than 1 Day | 2.3 |
| Ground Failure | 1 Unlikely | 2 Limited | 4 <6 Hours | 2 Less Than 1 Day | 1.85 |

4.1.6 GIS and HAZUS-MH

The third step in this assessment is the risk analysis which quantifies the risk to the population, infrastructure, and economy of the community. Where possible, the hazards were quantified using GIS analyses and HAZUS-MH. This process reflects a level two approach to analyzing hazards as defined for HAZUS-MH. The approach includes substitution of selected default data with local data. This process improved the accuracy of the model predictions.

HAZUS-MH generates a combination of site-specific and aggregated loss estimates depending on the analysis options that are selected and on the input that is provided by the user. Aggregate inventory loss estimates, which include building stock analysis, are based on the assumption that building stock is evenly distributed across census blocks/tracts. Therefore, it is possible that overestimates of damage will occur in some areas while underestimates will occur in other areas. With this in mind, total losses tend to be more reliable over larger geographic areas than for individual census blocks/tracts. It is important to note that HAZUS-MH is not intended to be a substitute for detailed engineering studies. Rather, it is intended to serve as a planning aid for communities interested in assessing their risk to flood-, earthquake-, and hurricane-related hazards. This documentation does not provide full details on the processes and procedures completed in the development of this project. It is only intended to highlight the major steps that were followed during the project.

Site-specific analysis is based on loss estimations for individual structures. For flooding, analysis of site-specific structures takes into account the depth of water in relation to the structure. HAZUS-MH also takes into account the actual dollar exposure to the structure for the costs of building reconstruction, content, and inventory. However, damages are based on the assumption that each structure will fall into a structural class, and structures in each class will respond in a similar fashion to a specific depth of flooding or ground shaking. Site-specific analysis is also based on a point location rather than a polygon, therefore the model does not account for the percentage of a building that is inundated. These assumptions suggest that the loss estimates for site-specific structures as well as for aggregate structural losses need to be viewed as approximations of losses that are subject to considerable variability rather than as exact engineering estimates of losses to individual structures.

The following events were analyzed. The parameters for these scenarios were created through GIS, HAZUS-MH, and historical information to predict which communities would be at risk.

Using HAZUS-MH

1. 100-year overbank flooding
2. Earthquake scenarios

Using GIS

1. Tornado
2. Hazardous material release

4.2 Vulnerability Assessment

4.2.1 Asset Inventory

4.2.1.1 Processes and Sources for Identifying Assets

The HAZUS-MH data is based on best available national data sources. The initial step involved updating the default HAZUS-MH data using State of Indiana data sources. At Meeting #1 the planning team members were provided with a plot and report of all HAZUS-MH critical facilities. The planning team took GIS data provided by The Polis Center; verified the datasets using local knowledge, and allowed The Polis Center to use their local GIS data for additional verification. Polis GIS analysts made these updates and corrections to the HAZUS-MH data tables prior to performing the risk assessment. These changes to the HAZUS-MH inventory reflect a level two analysis. This update process improved the accuracy of the model predictions.

The default HAZUS-MH data has been updated as follows:

- The HAZUS-MH defaults, critical facilities, and essential facilities have been updated based on the most recent available data sources. Critical and essential point facilities have been reviewed, revised, and approved by local subject matter experts at each county.
- The essential facility updates (schools, medical care facilities, fire stations, police stations, and EOCs) have been applied to the HAZUS-MH model data. HAZUS-MH reports of essential facility losses reflect updated data.

The default aggregate building inventory tables have been replaced with the most recent Assessor records. Owen County provided the parcel boundaries and addresses to The Polis Center, and Indiana Department of Local Government and Finance provided the Owen County Assessor records. Records without improvements were deleted. Addresses were spatially joined to the parcel boundaries and then linked to an Assessor record based on matching parcel numbers. The generated building inventory points represent the approximate locations (within a parcel) of building exposure. The parcel points were aggregated by census block.

Address-matching results for Owen County are provided in Table 4-8.

Table 4-8: Address-Matching for Owen County

| Data Source | Count |
|------------------------------------|--------------|
| Assessor Records | 16,551 |
| County Provided Addresses | 12,025 |
| Assessor Records with Improvements | 16,551 |
| Building Inventory | 9,699 |

The following assumptions were made during the analysis:

- The algorithm used to match county-provided address and parcel locations with the Assessor records is not perfect. The results in this analysis reflect matched address records only. The parcel-matching results for Owen County are included in Table 4-7.
- Population counts are based on 2.5 persons per household. Only residential occupancy classes are used to determine the impact on the local population. If the event were to occur at night, it would be assumed that people are at home (not school, work, or church).
- The analysis is restricted to the county boundaries. Events that occur near the county boundaries do not contain damage assessments from adjacent counties.

4.2.1.2 Essential Facilities List

Table 4-9 identifies the essential facilities that were added or updated for the analysis. Essential facilities are a subset of critical facilities. A complete list of critical facilities is included as Appendix F. A map of all critical facilities is included as Appendix G.

Table 4-9: Essential Facilities List

| Facility | Number of Facilities |
|------------------------------|-----------------------------|
| Care Facilities | 6 |
| Emergency Operations Centers | 2 |
| Fire Stations | 8 |
| Police Stations | 3 |
| Schools | 9 |

4.2.1.3 Facility Replacement Costs

Facility replacement costs and total building exposure are identified in Table 4-10. The replacement costs have been updated by local data when available. Table 4-10 also includes the estimated number of buildings within each occupancy class.

Table 4-10: Building Exposure

| General Occupancy | Estimated Total Buildings | Total Building Exposure (X 1000) |
|--------------------------|----------------------------------|---|
| Agricultural | 3,181 | \$275,996 |
| Commercial | 244 | \$42,429 |
| Education | 6 | \$4,769 |
| Government | 41 | \$9,755 |
| Industrial | 44 | \$18,005 |
| Religious/Non-Profit | 131 | \$41,026 |
| Residential | 6,052 | \$417,320 |
| Total | 9,699 | \$809,300 |

4.3 Future Development

Owen County, like most of the other 91 counties in the State of Indiana, will always be threatened by natural hazards. County government, in partnership with state government, must make a commitment to prepare for the management of those types of events if and when they occur. Likewise, the Owen County manufacturing base almost ensures that the county will remain vulnerable to hazardous material incidents and other technological threats. However, with the county-elected and appointed officials becoming informed leaders on the subject of community hazards, they will be able to set and direct policies that will enable emergency management and county response agencies to effectively plan, train, and exercise to meet these types of occurrences. The end result will be a stronger community and a better place to work, live, and grow.

4.4 Hazard Profiles

4.4.1 Tornado Hazard

Hazard Definition for Tornado Hazard

Tornadoes pose a great risk to the State of Indiana and its citizens. Tornadoes can occur at any time during the day or night. They can also happen during any month of the year. The unpredictability of tornadoes makes them one of Indiana's most dangerous hazards. Their extreme winds are violently destructive when they touch down in the region's developed and populated areas. Current estimates place the maximum velocity at about 300 mph, but higher and lower values can occur. A wind velocity of 200 mph will result in a wind pressure of 102.4 pounds per square foot of surface area—a load that exceeds the tolerance limits of most buildings. Considering these factors, it is easy to understand why tornadoes can be so devastating for the communities they hit.

Tornadoes are defined as violently-rotating columns of air extending from thunderstorms to the ground. Funnel clouds are rotating columns of air not in contact with the ground; however, the violently-rotating column of air can reach the ground very quickly and become a tornado. If the funnel cloud picks up and blows debris, it has reached the ground and is a tornado.

Tornadoes are classified according to the Fujita tornado intensity scale. The tornado scale ranges from low intensity F0 with effective wind speeds of 40 to 70 mph to F5 tornadoes with effective wind speeds of over 260 mph. The Fujita intensity scale is included in Table 4-11.

Table 4-11: Fujita Tornado Rating

| Fujita Number | Estimated Wind Speed | Path Width | Path Length | Description of Destruction |
|-----------------------------|-----------------------------|-------------------|--------------------|--|
| 0 <i>Gale</i> | 40-72 mph | 6-17 yards | 0.3-0.9 miles | Light damage, some damage to chimneys, branches broken, sign boards damaged, shallow-rooted trees blown over. |
| 1 <i>Moderate</i> | 73-112 mph | 18-55 yards | 1.0-3.1 miles | Moderate damage, roof surfaces peeled off, mobile homes pushed off foundations, attached garages damaged. |
| 2 <i>Significant</i> | 113-157 mph | 56-175 yards | 3.2-9.9 miles | Considerable damage, entire roofs torn from frame houses, mobile homes demolished, boxcars pushed over, large trees snapped or uprooted. |
| 3 <i>Severe</i> | 158-206 mph | 176-566 yards | 10-31 miles | Severe damage, walls torn from well-constructed houses, trains overturned, most trees in forests uprooted, heavy cars thrown about. |
| 4 <i>Devastating</i> | 207-260 mph | 0.3-0.9 miles | 32-99 miles | Complete damage, well-constructed houses leveled, structures with weak foundations blown off for some distance, large missiles generated. |
| 5 <i>Incredible</i> | 261-318 mph | 1.0-3.1 miles | 100-315 miles | Foundations swept clean, automobiles become missiles and thrown for 100 yards or more, steel-reinforced concrete structures badly damaged. |

Previous Occurrences for Tornado Hazard

There have been several occurrences of tornadoes within Owen County during the past few decades. The National Climatic Data Center (NCDC) database reported 12 tornadoes/funnel clouds in Owen County since 1950.

For example, in May 2004, an F1 tornado skipped along for almost 8.5 miles from near Freedom to Spencer. A few homes received significant damage midway along the path of the tornado. Fifteen total tornadoes touched down in central Indiana on May 30th, with damage estimates approaching \$13 million for central Indiana alone.

The Owen County NCDC recorded tornadoes are identified in Table 4-12. Additional details for NCDC events are included in Appendix D.

Table 4-12: Owen County Tornadoes*

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|-----------|---------|-----------|--------|----------|-----------------|-------------|
| Owen | 6/11/1955 | Tornado | F1 | 0 | 0 | 3K | 0 |
| Owen | 3/14/1957 | Tornado | F0 | 0 | 0 | 0K | 0 |
| Owen | 4/1/1959 | Tornado | F | 0 | 0 | 3K | 0 |
| Owen | 6/24/1973 | Tornado | F1 | 0 | 0 | 3K | 0 |
| Owen | 4/18/1975 | Tornado | F2 | 0 | 1 | 250K | 0 |
| Owen | 6/24/1976 | Tornado | F2 | 0 | 0 | 250K | 0 |
| Owen | 6/1/1978 | Tornado | F1 | 0 | 0 | 0K | 0 |
| Owen | 6/28/1980 | Tornado | F1 | 0 | 0 | 0K | 0 |
| Owen | 5/19/1989 | Tornado | F1 | 0 | 0 | 25K | 0 |
| Whitehall | 4/27/1994 | Tornado | F1 | 0 | 0 | 50K | 0 |
| Freedom | 5/30/2004 | Tornado | F1 | 0 | 0 | 300K | 0 |
| Gospport | 6/27/2008 | Tornado | F0 | 0 | 0 | 20K | 0 |

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

Geographic Location for Tornado Hazard

The entire county has the same risk for occurrence of tornadoes. They can occur at any location within the county.

Hazard Extent for Tornado Hazard

The historical tornadoes generally move from southwest to northeast across the county. The extent of the hazard varies both in terms of the extent of the path and the wind speed.

Calculated Priority Risk Index for Tornado Hazard

Based on historical information, the probability of a tornado is highly likely. Tornadoes with varying magnitudes are expected to happen. According to the CPRI, tornadoes ranked as the number one hazard in Owen County.

CPRI = Probability X .45 + Magnitude/Severity X .30 + Warning Time X .15 + Duration of event X .10.

| | | | | | | | | |
|-------------|---|---------------------|---|--------------|---|----------|---|------|
| Probability | + | Magnitude /Severity | + | Warning Time | + | Duration | = | CPRI |
| 4 x .45 | + | 3 x .30 | + | 4 x .15 | + | 1 x .10 | = | 3.4 |

Vulnerability Analysis for Tornado Hazard

Tornadoes can occur within any area in the county; therefore, the entire county population and all buildings are vulnerable to tornadoes. To accommodate this risk, this plan will consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Owen County are discussed in Table 4-9.

Critical Facilities

All critical facilities are vulnerable to tornadoes. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts will vary based on the magnitude of the tornado, but can include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). Table 4-8 lists the types and numbers of all of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

The building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-9. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, and loss of building function (e.g. damaged home will no longer be habitable causing residents to seek shelter).

Infrastructure

During a tornado the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable, it is important to emphasize that any number of these items could become damaged during a tornado. The impacts to these items include broken, failed, or impassable roadways, broken or failed utility lines (e.g. loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

An example scenario is described as follows to gauge the anticipated impacts of tornadoes in the county, in terms of numbers and types of buildings and infrastructure.

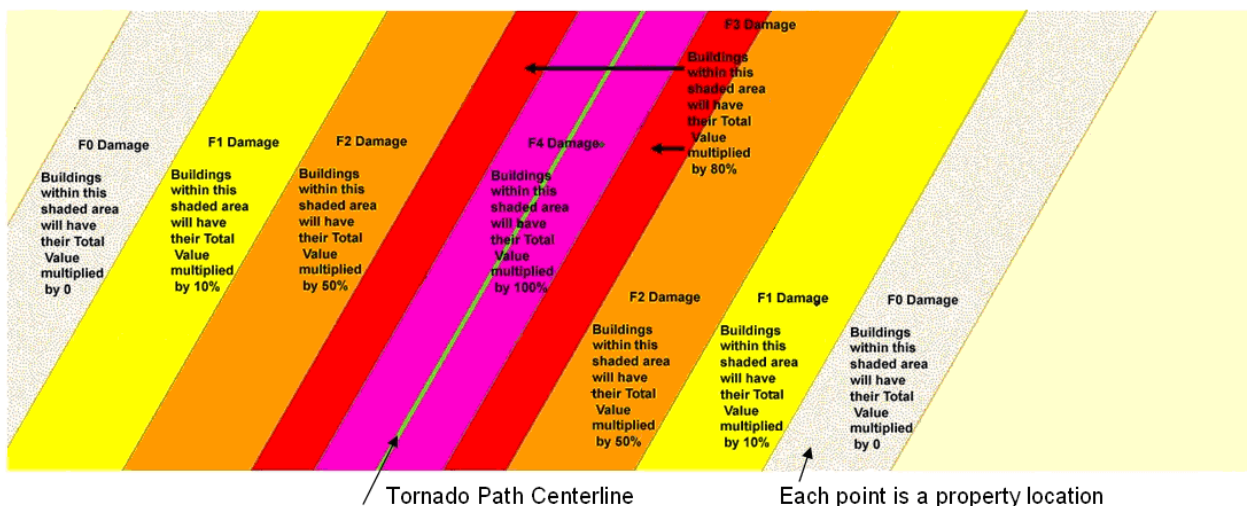
GIS overlay modeling was used to determine the potential impacts of an F4 tornado. The analysis used a hypothetical path for an F4 tornado event that ran for 21 miles. The hypothetical tornado moved through Owen County in a north easterly direction, directly impacting the communities of Spencer and Gosport. The selected widths were modeled after a recreation of the Fujita-Scale guidelines based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these six categories. Table 4-13 depicts tornado damage curves as well as path widths.

Table 4-13: Tornado Path Widths and Damage Curves

| Fujita Scale | Path Width (feet) | Maximum Expected Damage |
|--------------|-------------------|-------------------------|
| F5 | 3,000 | 100% |
| F4 | 2,400 | 100% |
| F3 | 1,800 | 80% |
| F2 | 1,200 | 50% |
| F1 | 600 | 10% |
| F0 | 300 | 0% |

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path with a decreasing amount of damage away from the center of the path. This natural process was modeled in GIS by adding damage zones around the tornado path. Figure 4-1 and Table 4-14 describe the zone analysis.

Figure 4-1: GIS Analysis Using Tornado Buffers



Once the hypothetical route is digitized on the map, several buffers are created to model the damage functions within each zone.

An F4 tornado has four damage zones, depicted in Table 4-14. Total devastation is estimated within 150 feet of the tornado path (the darker-colored Zone 1). The outer buffer is 900 feet from the tornado path (the lightest-colored Zone 4), within which 10% of the buildings will be damaged.

Table 4-14: Tornado Zones and Damage Curves

| Fujita Scale | Zone | Buffer (feet) | Damage Curve |
|--------------|------|---------------|--------------|
| F4 | 4 | 600-900 | 10% |
| F4 | 3 | 300-600 | 50% |
| F4 | 2 | 150-300 | 80% |
| F4 | 1 | 0-150 | 100% |

The selected hypothetical tornado path is depicted in Figure 4-2, and the damage curve buffers are shown in Figure 4-3.

Figure 4-2: Hypothetical F4 Tornado Path in Owen County

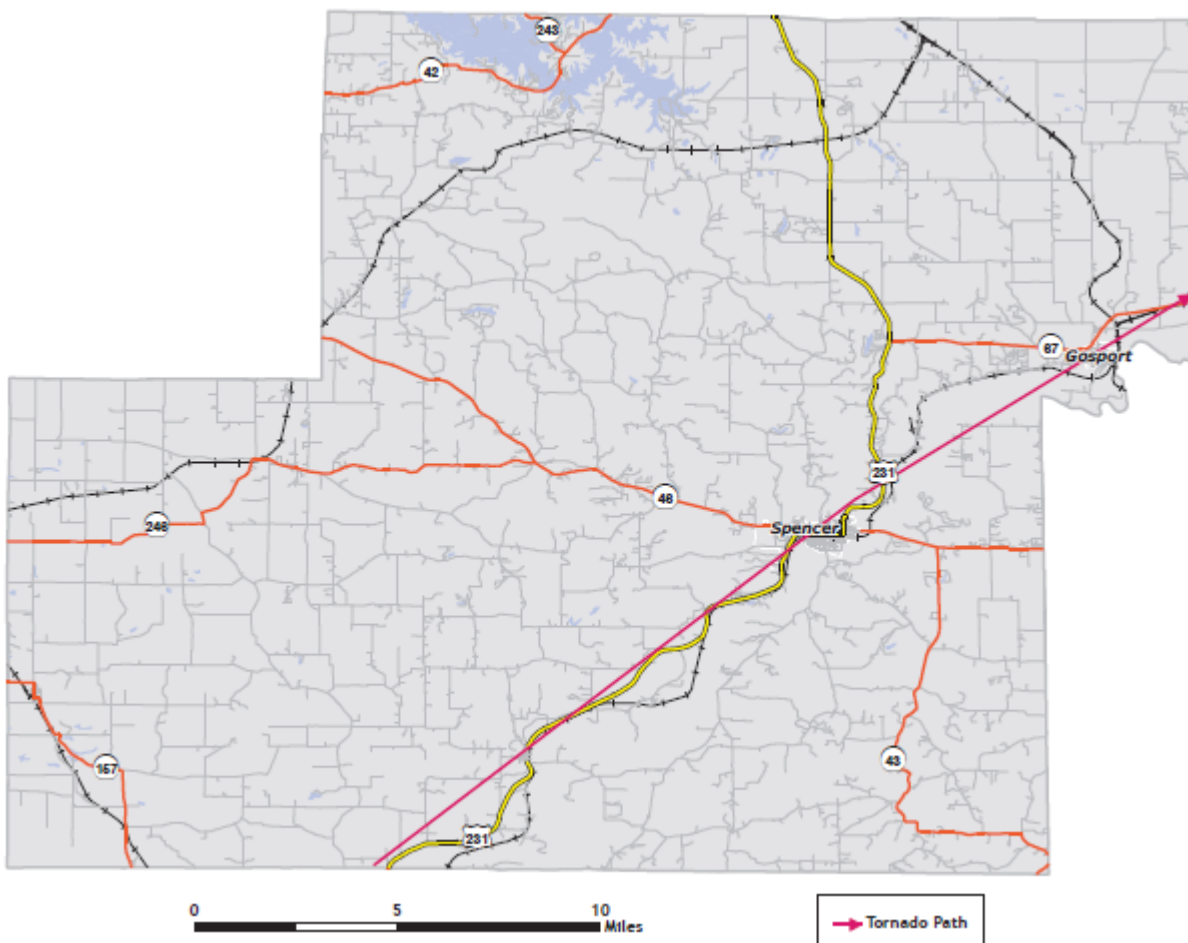
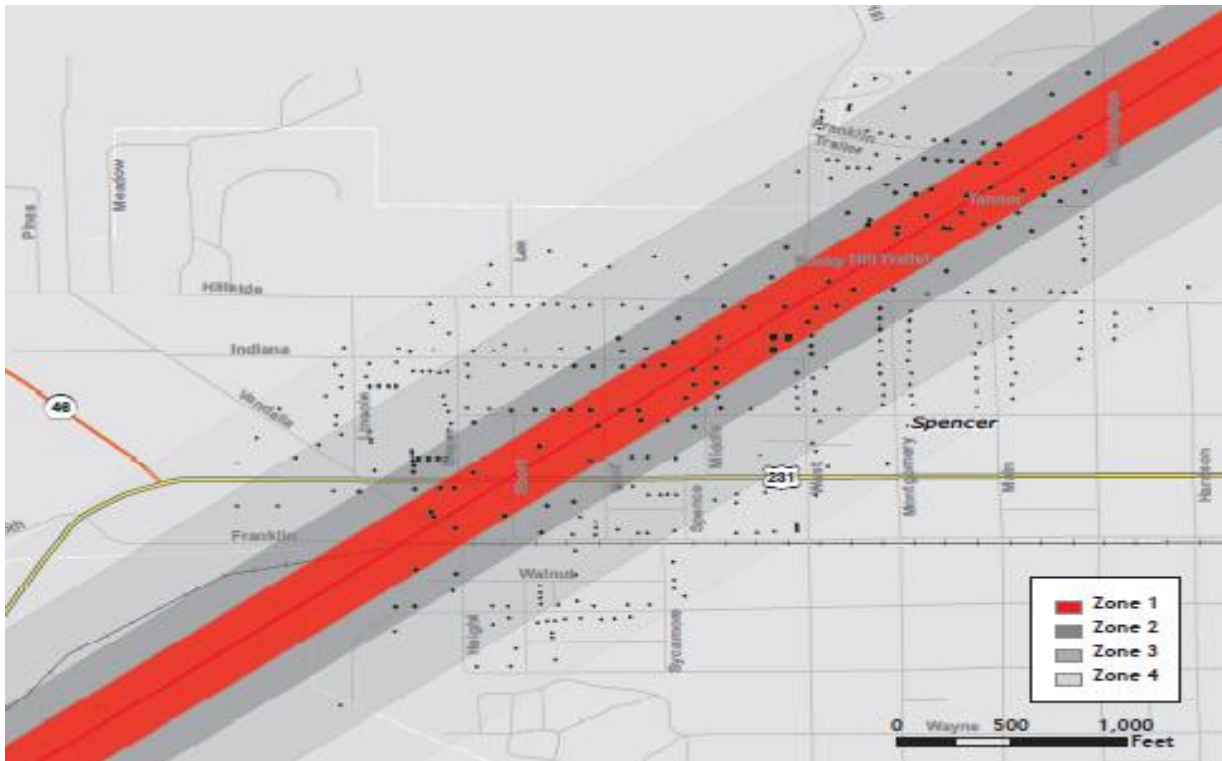


Figure 4-3: Modeled F4 Tornado Damage Buffers in Owen County

The results of the analysis are depicted in Tables 4-15 and 4-16. The GIS analysis estimates that 898 buildings will be damaged. The estimated building losses were \$41.6 million. The building losses are an estimate of building replacement costs multiplied by the percentages of damage. The overlay was performed against parcels provided by Owen County that were joined with Assessor records showing property improvement.

Table 4-15: Estimated Numbers of Buildings Damaged by Occupancy Type

| Occupancy | Zone 1 | Zone 2 | Zone 3 | Zone 4 |
|--------------|------------|------------|------------|------------|
| Residential | 108 | 105 | 259 | 241 |
| Commercial | 7 | 17 | 17 | 19 |
| Industrial | 0 | 0 | 18 | 8 |
| Agriculture | 14 | 7 | 26 | 21 |
| Religious | 5 | 6 | 5 | 8 |
| Government | 0 | 0 | 2 | 4 |
| Education | 0 | 0 | 0 | 1 |
| Total | 134 | 135 | 327 | 302 |

Table 4-16: Estimated Building Losses by Occupancy Type (X 1000)

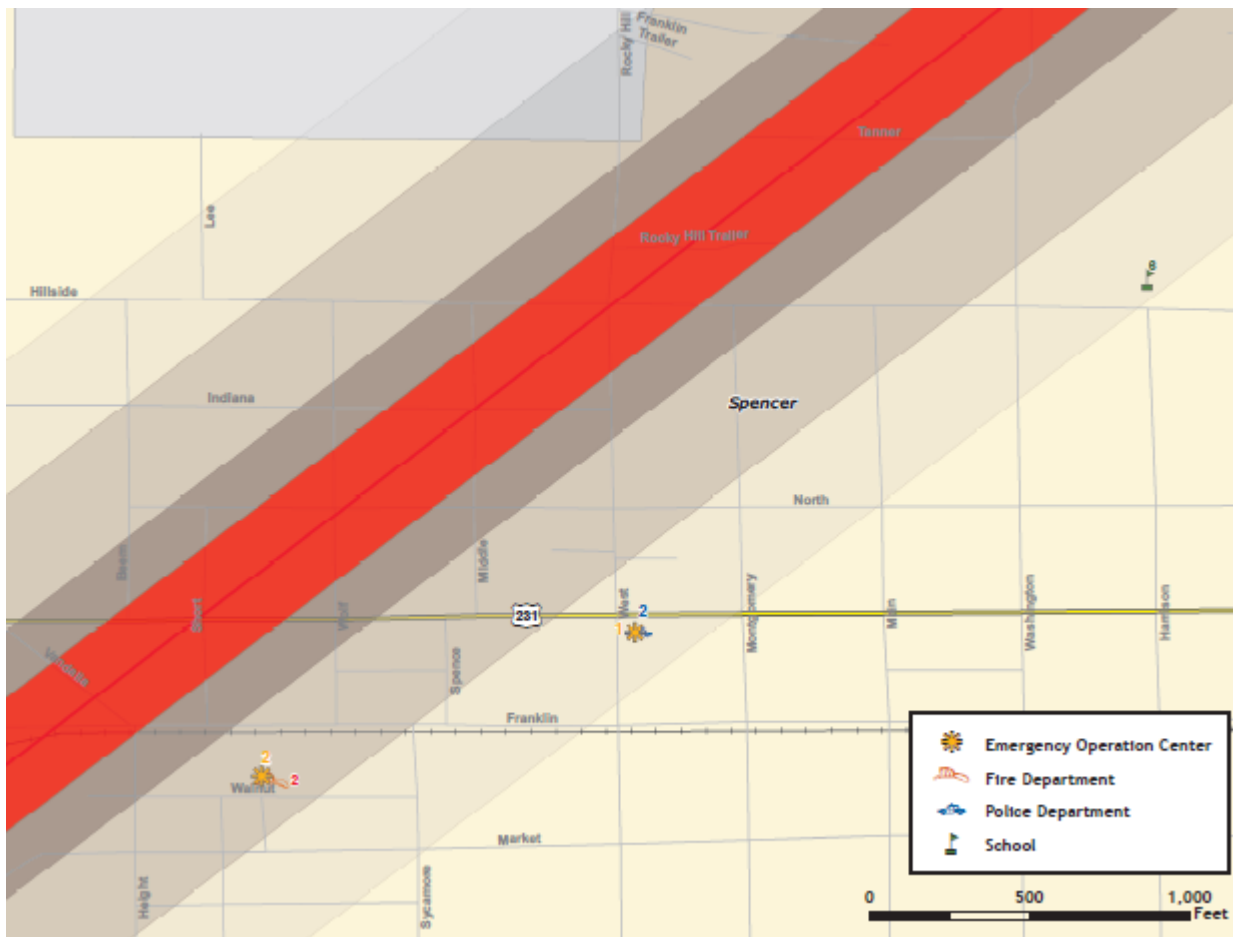
| Occupancy | Zone 1 | Zone 2 | Zone 3 | Zone 4 |
|------------------|-----------------|-----------------|-----------------|----------------|
| Residential | \$7,539 | \$7,234 | \$10,881 | \$2,302 |
| Commercial | \$885 | \$3,727 | \$1,868 | \$213 |
| Industrial | \$0 | \$0 | \$141 | \$43 |
| Agriculture | \$1,474 | \$404 | \$1,320 | \$239 |
| Religious | \$962 | \$1,837 | \$191 | \$202 |
| Government | \$0 | \$0 | \$133 | \$64 |
| Education | \$0 | \$0 | \$0 | \$0 |
| Total | \$10,859 | \$13,202 | \$14,534 | \$3,062 |

Essential Facilities Damage

There are seven essential facilities located within 900 feet of the hypothetical tornado path. The model predicts that two emergency operations centers, two fire departments, one police department, and two elementary schools would experience damage. The affected facilities are identified in Table 4-17, and their geographic locations are shown in Figure 4-4.

Table 4-17: Estimated Essential Facilities Affected

| Name |
|---|
| Owen County Emergency Operations Center |
| Owen Valley Fire Department EOC |
| Owen Valley Fire Department |
| Freedom Fire Department |
| Spencer Police Department |
| Gosport Elementary School |
| Spencer Elementary School |

Figure 4-4: Essential Facilities within Tornado Path

Vulnerability to Future Assets/Infrastructure for Tornado Hazard

The entire population and buildings have been identified as at risk because tornadoes can occur anywhere within the State of Indiana, at any time of the day, and during any month of the year. Furthermore, any future development in terms of new construction within the county will be at risk. The building exposure for Owen County is included in Table 4-9.

All critical facilities in the county and communities within the county are at risk. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Analysis of Community Development Trends

Preparing for severe storms will be enhanced if officials sponsor programs and initiatives to address the overall safety of county residents. New structures should be built with sturdier construction; those structures already in place should be hardened to lessen the potential impacts of severe weather. Community warning sirens to provide warnings of approaching storms are also vital to preventing the loss of property and ensuring the safety of Owen County residents.

4.4.2 Flood Hazard

Hazard Definition for Flooding

Flooding is a significant natural hazard throughout the United States. The type, magnitude, and severity of flooding are functions of the amount and distribution of precipitation over a given area, the rate at which precipitation infiltrates into the ground, the geometry and hydrology of the catchment, and flow dynamics and conditions in and along the river channel. Floods can be classified as one of two types: upstream floods or downstream floods. Both types of floods are common in Indiana. Upstream floods, also called flash floods, occur in the upper parts of drainage basins and are generally characterized by periods of intense rainfall over a short duration. These floods arise with very little warning and often result in locally intense damage, and sometimes loss of life, due to the high energy of the flowing water. Flood waters can snap trees, topple buildings, and easily move large boulders or other structures. Six inches of rushing water can upend a person; another 18 inches might carry off a car. Generally, upstream floods cause damage over relatively localized areas, but they can be quite severe in the local areas where they occur. Urban flooding is a type of upstream flood. Urban flooding involves the overflow of storm drain systems and can be the result of inadequate drainage combined with heavy rainfall or rapid snowmelt. Upstream or flash floods can occur at anytime of the year in Indiana, but they are most common in the spring and summer months.

Downstream floods, sometimes called riverine floods, refer to floods on large rivers at locations with large upstream catchments. Downstream floods are typically associated with precipitation events that are of relatively long duration and occur over large areas. Flooding on small tributary streams may be limited, but the contribution of increased runoff may result in a large flood downstream. The lag time between precipitation and time of the flood peak is much longer for downstream floods than for upstream floods, generally providing ample warning for people to move to safe locations and, to some extent, secure some property against damage. Riverine flooding on the large rivers of Indiana generally occurs during either the spring or summer.

Hazard Definition for Dam and Levee Failure

Dams are structures that retain or detain water behind a large barrier. When full or partially full, the difference in elevation between the water above the dam and below creates large amounts of potential energy, creating the potential for failure. The same potential exists for levees when they serve their purpose, which is to confine flood waters within the channel area of a river and exclude that water from land or communities land-ward of the levee. Dams and levees can fail due to either: 1) water heights or flows above the capacity for which the structure was designed; or 2) deficiencies in the structure such that it can not hold back the potential energy of the water. If a dam or levee fails, issues of primary concern include loss of human life/injury, downstream property damage, lifeline disruption (of concern would be transportation routes and utility lines required to maintain or protect life), and environmental damage.

Many communities view both dams and levees as permanent and infinitely safe structures. This sense of security may well be false, leading to significantly increased risks. Both downstream of dams and on floodplains protected by levees, security leads to new construction, added infrastructure, and increased population over time. Levees in particular are built to hold back flood waters only up to some maximum level, often the 100-year (1% annual probability) flood

event. When that maximum is exceeded by more than the design safety margin, then the levee will be overtopped or otherwise fail, inundating communities in the land previously protected by that levee. It has been suggested that climate change, land-use shifts, and some forms of river engineering may be increasing the magnitude of large floods and the frequency of levee-failure situations.

In addition to failure that results from extreme floods above the design capacity, levees and dams can fail due to structural deficiencies. Both dams and levees require constant monitoring and regular maintenance to assure their integrity. Many structures across the U.S. have been underfunded or otherwise neglected, leading to an eventual day of reckoning in the form either of realization that the structure is unsafe or, sometimes, an actual failure. The threat of dam or levee failure may require substantial commitment of time, personnel, and resources. Since dams and levees deteriorate with age, minor issues become larger compounding problems, and the risk of failure increases.

Previous Occurrences for Flooding

The National Weather Service lists the top 20 historical flood elevations for the White River at Spencer stream gauge. Of those listed, more than half have occurred in the past decade, which has also seen some of the most damaging flash floods. Appendix H lists the stream gauge data of historical crests.

The NCDC database reported 86 flood events in Owen County since 1950; they are identified in Table 4-18. Additional details for NCDC events are included in Appendix D.

Table 4-18: Owen County Previous Occurrences of Flooding*

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|------------|----------------------|-----------|--------|----------|-----------------|-------------|
| Owen | 11/14/1993 | Flood | N/A | 0 | 0 | 5.0M | 500K |
| Owen | 4/12/1994 | Flood | N/A | 1 | 0 | 500K | 0 |
| Owen | 3/7/1995 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 5/4/1996 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 5/4/1996 | Flood | N/A | 0 | 0 | 0 | 0 |
| Spencer | 8/15/1996 | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 2/27/1997 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 3/1/1997 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/10/1998 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 3/21/1998 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 4/9/1998 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 4/16/1998 | Flood | N/A | 0 | 0 | 60K | 0 |
| Cataract | 5/19/1998 | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 |
| Spencer | 5/23/1998 | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 |
| Owen | 6/12/1998 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 6/19/1998 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 6/22/1998 | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 |

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|------------|-------------|-----------|--------|----------|-----------------|-------------|
| Owen | 6/28/1998 | Flash Flood | N/A | 0 | 0 | 4.0M | 0 |
| Owen | 6/29/1998 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/17/1999 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/21/1999 | Flood | N/A | 0 | 0 | 19.0M | 0 |
| Owen | 1/21/1999 | Flood | N/A | 0 | 0 | 250K | 0 |
| Owen | 2/1/1999 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 2/7/1999 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 2/28/1999 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 6/2/1999 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 4/9/2000 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 6/21/2000 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 10/5/2000 | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 10/5/2000 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 10/5/2000 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 12/12/2000 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 12/16/2000 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/30/2001 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 2/9/2001 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 2/24/2001 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 10/13/2001 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 10/24/2001 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 12/15/2001 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 2/1/2002 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 3/30/2002 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 4/1/2002 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 5/1/2002 | Flood | N/A | 0 | 0 | 250K | 0 |
| New Hope | 5/7/2002 | Flash Flood | N/A | 0 | 0 | 25K | 0 |
| Owen | 5/7/2002 | Flood | N/A | 0 | 0 | 50K | 0 |
| Owen | 5/12/2002 | Flash Flood | N/A | 0 | 0 | 50K | 0 |
| Owen | 5/12/2002 | Flood | N/A | 0 | 0 | 500K | 0 |
| Owen | 5/10/2003 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 7/5/2003 | Flood | N/A | 0 | 0 | 41.6M | 12.0M |
| Owen | 9/1/2003 | Flood | N/A | 0 | 0 | 22.0M | 0 |
| Owen | 9/1/2003 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 9/1/2003 | Flood | N/A | 0 | 0 | 2.5M | 0 |
| Owen | 12/24/2003 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/3/2004 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/4/2004 | Flood | N/A | 3 | 0 | 0 | 0 |
| Owen | 5/28/2004 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 6/1/2004 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 6/14/2004 | Flood | N/A | 0 | 0 | 0 | 0 |
| Spencer | 7/10/2004 | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/3/2005 | Flood | N/A | 1 | 0 | 9.0M | 0 |
| Owen | 1/3/2005 | Flood | N/A | 0 | 0 | 0 | 0 |
| Owen | 8/30/2005 | Flood | N/A | 0 | 0 | 0 | 0 |
| Spencer | 3/9/2006 | Flood | N/A | 0 | 0 | 10K | 0 |

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|-----------|-------------|-----------|--------|----------|-----------------|-------------|
| Spencer | 3/9/2006 | Flood | N/A | 0 | 0 | 100K | 0 |
| Spencer | 12/1/2006 | Flood | N/A | 0 | 0 | 10K | 0K |
| Spencer | 1/1/2007 | Flood | N/A | 0 | 0 | 10K | 0K |
| Spencer | 3/2/2007 | Flood | N/A | 0 | 0 | 10K | 0K |
| Spencer | 3/16/2007 | Flood | N/A | 0 | 0 | 10K | 0K |
| Spencer | 3/24/2007 | Flood | N/A | 0 | 0 | 10K | 0K |
| Spencer | 6/27/2007 | Flood | N/A | 0 | 0 | 11K | 0K |
| Spencer | 1/9/2008 | Flood | N/A | 0 | 0 | 10K | 0K |
| Southport | 2/6/2008 | Flood | N/A | 0 | 0 | 15K | 0K |
| Spencer | 3/4/2008 | Flood | N/A | 0 | 0 | 15K | 0K |
| Spencer | 3/19/2008 | Flood | N/A | 0 | 0 | 15K | 0K |
| Spencer | 5/14/2008 | Flood | N/A | 0 | 0 | 5K | 5K |
| Cunot | 6/4/2008 | Flash Flood | N/A | 0 | 0 | 2K | 0K |
| Adel | 6/4/2008 | Flash Flood | N/A | 0 | 0 | 0K | 0K |
| Farmers | 6/4/2008 | Flash Flood | N/A | 0 | 0 | 1K | 0K |
| Freedom | 6/4/2008 | Flash Flood | N/A | 0 | 0 | 0K | 0K |
| Spencer | 6/4/2008 | Flood | N/A | 0 | 0 | 50.0M | 60.0M |
| Spencer | 6/7/2008 | Flash Flood | N/A | 0 | 0 | 10K | 0K |
| Spencer | 6/7/2008 | Flash Flood | N/A | 0 | 0 | 200K | 10K |
| Spencer | 6/9/2008 | Flash Flood | N/A | 0 | 0 | 5K | 0K |
| Spencer | 6/13/2008 | Flash Flood | N/A | 0 | 0 | 5K | 5K |
| Spencer | 7/12/2008 | Flash Flood | N/A | 0 | 0 | 0K | 0K |
| Spencer | 7/13/2008 | Flood | N/A | 0 | 0 | 5K | 5K |

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

Previous Occurrences for Dam and Levee Dam Failure

According to the Owen County planning team, the Greybrook Lake Dam completely failed in June 2008, causing extensive damage to some properties. The dam failure also damaged a bridge on Indiana Highway 46 so severely that it required closure and considerable repair.

Repetitive Loss Properties

FEMA defines a repetitive loss structure as a structure covered by a contract of flood insurance issued under the NFIP, which has suffered flood loss damage on two occasions during a 10-year period that ends on the date of the second loss, in which the cost to repair the flood damage is 25% of the market value of the structure at the time of each flood loss.

Indiana Department of Natural Resources (IDNR) and the Indiana Department of Homeland Security (IDHS) were contacted to determine the location of repetitive loss structures. According to the 2006 supplied data, Owen County has six repetitive loss structures. The total amount paid

for building replacement and building contents for damages to these repetitive loss structures is \$247,030.02. Table 4-19 describes the loss structures in terms of occupancy and jurisdiction.

Table 4-19: Owen County Repetitive Loss Structures

| Jurisdiction | Occupancy Type | Number of Structures | Number of Losses | Total Paid |
|---------------------|-----------------------|-----------------------------|-------------------------|---------------------|
| Gosport | Single-Family | 1 | 2 | \$38,681.26 |
| Owen County | Single-Family | 2 | 7 | \$75,154.84 |
| Spencer | Single-Family | 3 | 9 | \$133,193.92 |
| Totals | | 6 | 18 | \$247,030.02 |

Geographic Location for Flooding

Most river flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Severe thunderstorms may cause flooding during the summer or fall, but tend to be localized. The primary sources of river flooding in Owen County are the White River and Eel River.

Flash floods, brief heavy flows in small streams or normally dry creek beds, also occur within the county. Flash flooding is typically characterized by high-velocity water, often carrying large amounts of debris. Urban flooding involves the overflow of storm drain systems and is typically the result of inadequate drainage following heavy rainfall or rapid snowmelt.

The IDNR recently digitized the paper FEMA Flood Insurance Rate Maps (FIRM). These digital files, although not official FIRMs, provided the boundary which was the basis for this analysis. The overbank flooding areas are depicted on the map in Appendix E. Flash flooding may occur countywide.

The National Oceanic and Atmospheric Administration (NOAA) Advanced Hydrologic Prediction Service provides information from gauge locations at points along various rivers across the United States. For Owen County, data is provided for two points: White River at Spencer and Mill Creek near Cataract. Appendix H lists information pulled from the NOAA website, which includes flood categories, historical crests, and details about anticipated impacts to agricultural lands, dams, levees, and other built structures at significant flood crest levels.

Geographic Location for Dam and Levee Failure

The National Inventory of Dams identified 20 dams in Owen County. The dams and levees listed in this multi-hazard mitigation plan are recorded from historical IDNR data. Their physical presences were not confirmed; therefore, new or unrecorded structures may exist. A more complete list of locations is included in Appendix G.

The map in Appendix G illustrates the location of Owen County dams. Table 4-20 summarizes the National Inventory of Dams information.

Table 4-20: National Inventory of Dams

| Dam Name | River | Hazard | EAP |
|---------------------------|--|--------|-----|
| MILLER POND DAM | Unnamed Tributary Rattlesnake Creek | L | N |
| HOLLYBROOK LAKE DAM | White River | H | Y |
| CAMP OTTO DAM | Unnamed Tributary Doe Creek | L | N |
| ELLISTON CREEK DAM | White River | S | N |
| STROUSE S LITTLE PINE DAM | Unnamed Tributary Fish Creek | L | N |
| GREYBROOK LAKE DAM | Unnamed Tributary East Fork Fish Creek | L | N |
| THOMAS LAKE DAM | Unnamed Tributary Fish Creek | L | N |
| MILLS LAKE DAM | Unnamed Tributary Sixmile Creek | S | N |
| AMAZON LAKE DAM | Mill Creek | H | N |
| RALPH KETCHUM DAM | Unnamed Tributary White River | L | N |
| SPENCER CONS. CLUB DAM | Unnamed Tributary Naans Branch | L | N |
| BUCK LAKE DAM | White River | L | N |
| DUGAN LAKE DAM | Unnamed Tributary Fall Creek | H | N |
| ELLIS LAKE DAM | White River | L | N |
| TIMBER RIDGE LAKE DAM | Unnamed Tributary McBride Branch | L | N |
| LOCUST LAKE DAM | Unnamed Tributary Little Mill Creek | S | N |
| SALTER LAKE DAM | Unnamed Tributary Brush Creek | L | N |
| MONDS LAKE DAM | Unnamed Tributary Coon Creek | L | N |
| WAGNER LAKE DAM | Unnamed Tributary Rattlesnake Creek | S | N |
| WASATCH LAKE DAM | King Creek | L | N |

A review of the Indiana Department of Natural Resource's files identified one levee in Owen County—George Shepherd Levee at White River and Fish Creek.

Hazard Extent for Flooding

The HAZUS-MH flood model is designed to generate a flood depth grid and flood boundary polygon by deriving hydrologic and hydraulic information based on user-provided elevation data or by incorporating selected output from other flood models. HAZUS-MH also has the ability to clip a Digital Elevation Model (DEM) with a user-provided flood boundary, thus creating a flood depth grid. For Owen County HAZUS-MH was used to extract flood depth by clipping the DEM with the IDNR FIRMs Base Flood Elevation (BFE) boundary. The BFE is defined as the area that has a 1% chance of flooding in any given year.

Flood hazard scenarios were modeled using GIS analysis and HAZUS-MH. The flood hazard modeling was based on historical occurrences and current threats. Existing IDNR flood maps were used to identify the areas of study. These digital files, although not official FIRMs, provided the boundary which was the basis for this analysis. Planning team input and a review of historical information provided additional information on specific flood events.

Hazard Extent for Dam and Levee Failure

When dams are assigned the low (L) hazard potential classification, it means that failure or incorrect operation of the dam will result in zero human life losses and no low economic and/or environmental losses. Losses are principally limited to the owner's property. Dams assigned the

significant (S) hazard classification are those dams in which failure or incorrect operation results in no probable loss of human life; however it can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Dams classified as significant hazard potential dams are often located in predominantly rural or agricultural areas, but could be located in populated areas with a significant amount of infrastructure. Dams assigned the high (H) hazard potential classification are those dams in which failure or incorrect operation has the highest risk to cause loss of human life and significant damage to buildings and infrastructure.

According to the IDNR and the National Inventory of Dams, three dams are classified as high hazard dams. One dam has an Emergency Action Plan (EAP). An EAP is not required by the State of Indiana but is recommended in the 2003 Indiana Dam Safety & Inspection Manual.

Accurate mapping of the risks of flooding behind levees depends on knowing the condition and level of protection the levees actually provide. FEMA and the U.S. Army Corps of Engineers are working together to make sure that flood hazard maps clearly reflect the flood protection capabilities of levees, and that the maps accurately represent the flood risks posed to areas situated behind them. Levee owners—usually states, communities, or in some cases private individuals or organizations—are responsible for ensuring that the levees they own are maintained according to their design. In order to be considered creditable flood protection structures on FEMA's flood maps, levee owners must provide documentation to prove the levee meets design, operation, and maintenance standards for protection against the one-percent-annual chance flood.

Calculated Priority Risk Index for Flooding

Based on historical information and the HAZUS-MH flooding analysis results, the probability of flooding is highly likely. According to the CPRI, flooding ranked as the number two hazard in Owen County.

CPRI = Probability X .45 + Magnitude/Severity X .30 + Warning Time X .15 + Duration of event X .10.

| | | | | | | | | |
|--------------------|----------|----------------------------|----------|---------------------|----------|-----------------|----------|-------------|
| Probability | + | Magnitude /Severity | + | Warning Time | + | Duration | = | CPRI |
| 4 x .45 | + | 2 x .30 | + | 3 x .15 | + | 3 x .10 | = | 3.15 |

Calculated Priority Risk Index for Dam and Levee Failure

Based on operation and maintenance requirements, and local knowledge of the dams in Owen County, the probability of failure is unlikely. However, if a high hazard dam were to fail, the magnitude and severity of the damage could be critical and the warning time and duration of the dam failure event would be very short.

HAZUS-MH Analysis Using 100-Year Flood Boundary and County Parcels

HAZUS-MH generated the flood depth grid for a 100-year return period and made calculations by clipping the IGS 1/3 ArcSecond DEM to the flood boundary. Next, HAZUS-MH utilized a user-defined analysis of Owen County with site-specific parcel data provided by the county.

HAZUS-MH estimates the 100-year flood would damage 411 buildings at a replacement cost of \$6.1 million. The total estimated numbers of damaged buildings are given in Table 4-21. Figure 4-5 depicts the Owen County parcel points that fall within the 100-year floodplain. Figure 4-6 highlight damaged buildings within the floodplain areas in Spencer.

Table 4-21: Owen County Potential Damaged Buildings

| General Occupancy | Number of Buildings Damaged | Total Building Damage (x1000) |
|-------------------|-----------------------------|-------------------------------|
| Residential | 297 | \$4,319 |
| Commercial | 34 | \$688 |
| Industrial | 2 | \$455 |
| Agricultural | 68 | \$590 |
| Religious | 6 | \$45 |
| Government | 4 | \$28 |
| Education | 0 | \$0 |
| Total | 411 | \$6,126 |

Figure 4-5: Owen County Buildings in Floodplain (100-Year Flood)

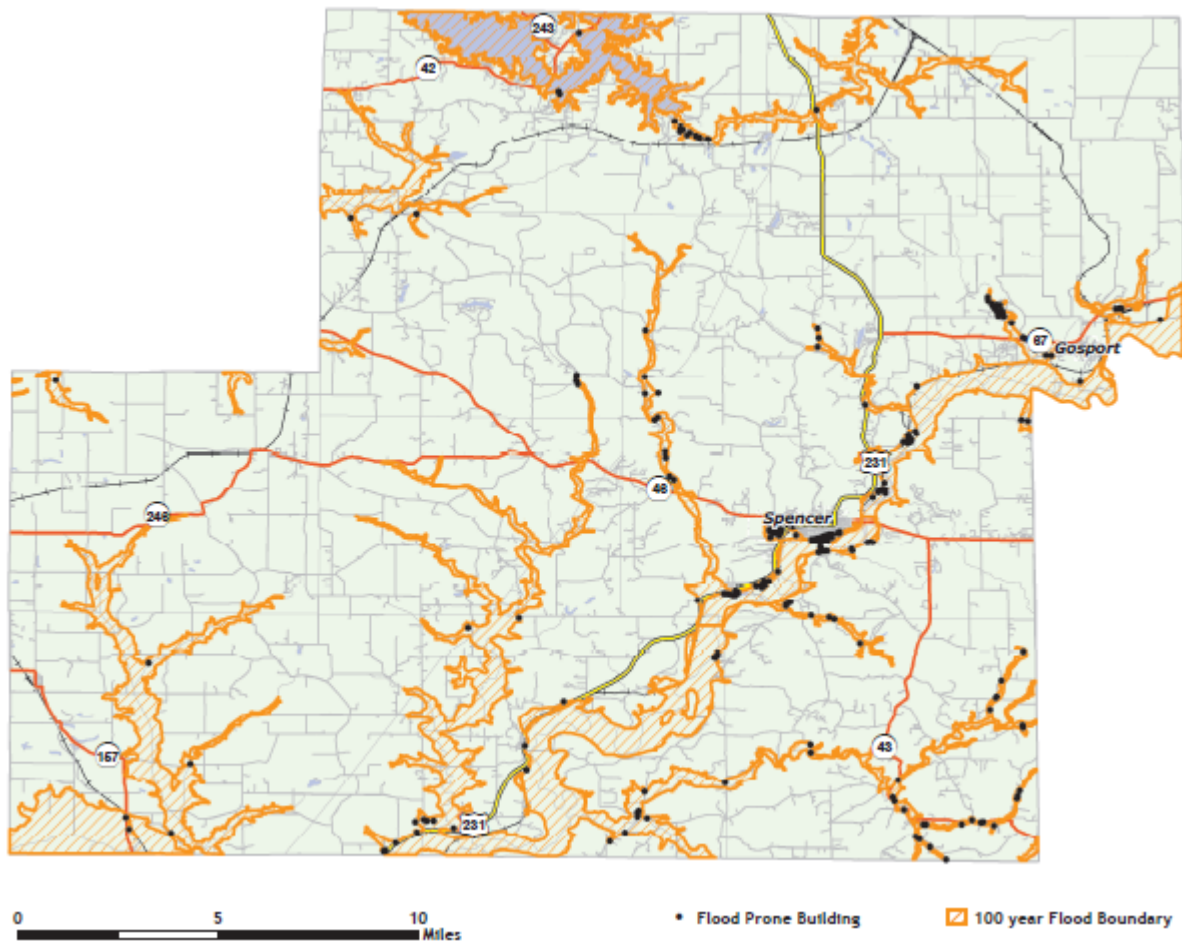
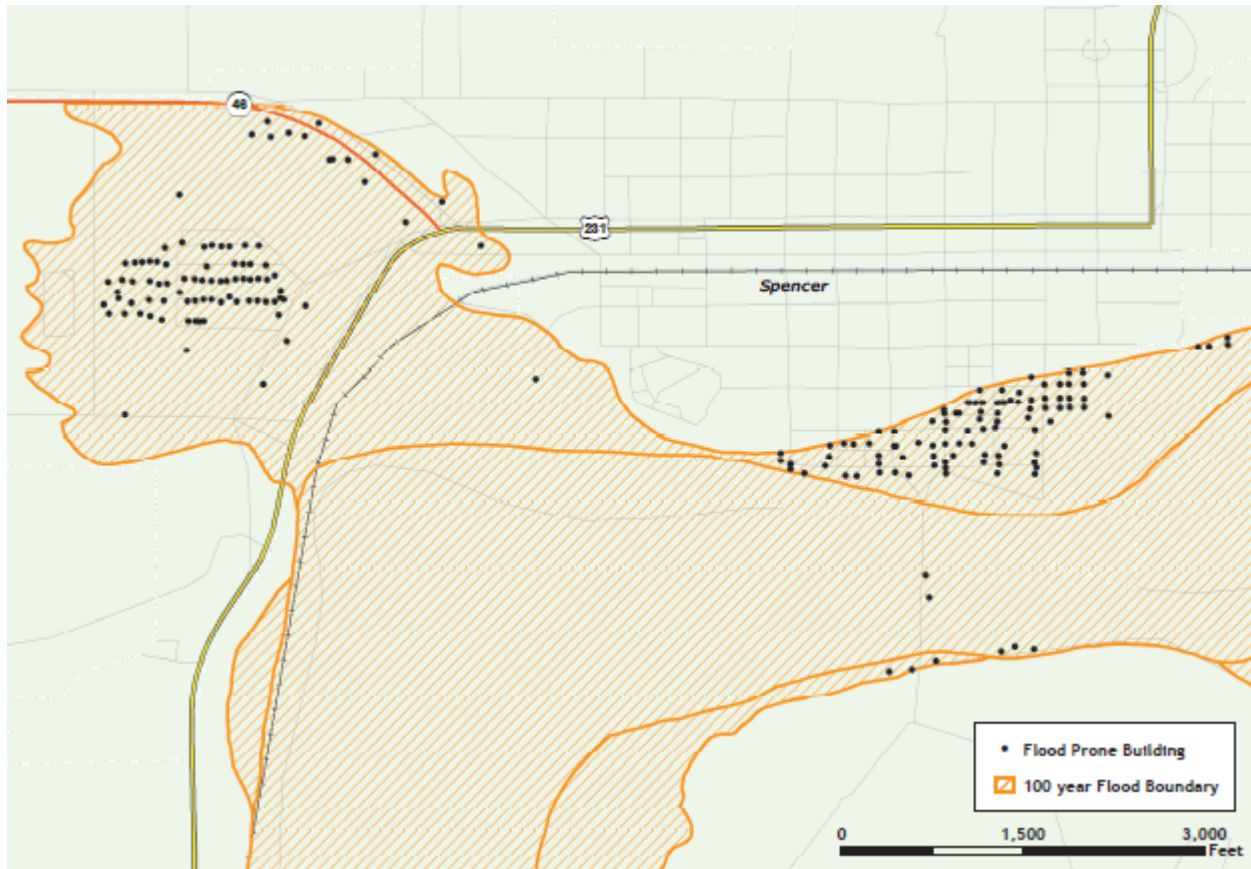


Figure 4-6: Owen County Urban Areas (Spencer) Flood-Prone Areas (100-Year Flood)



Essential Facilities

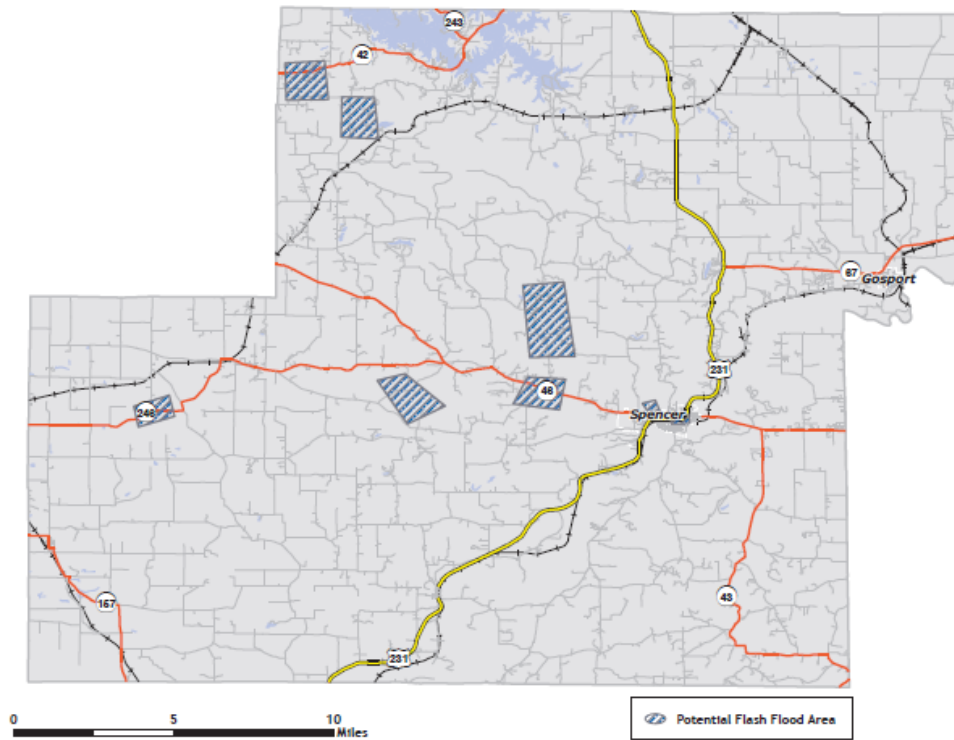
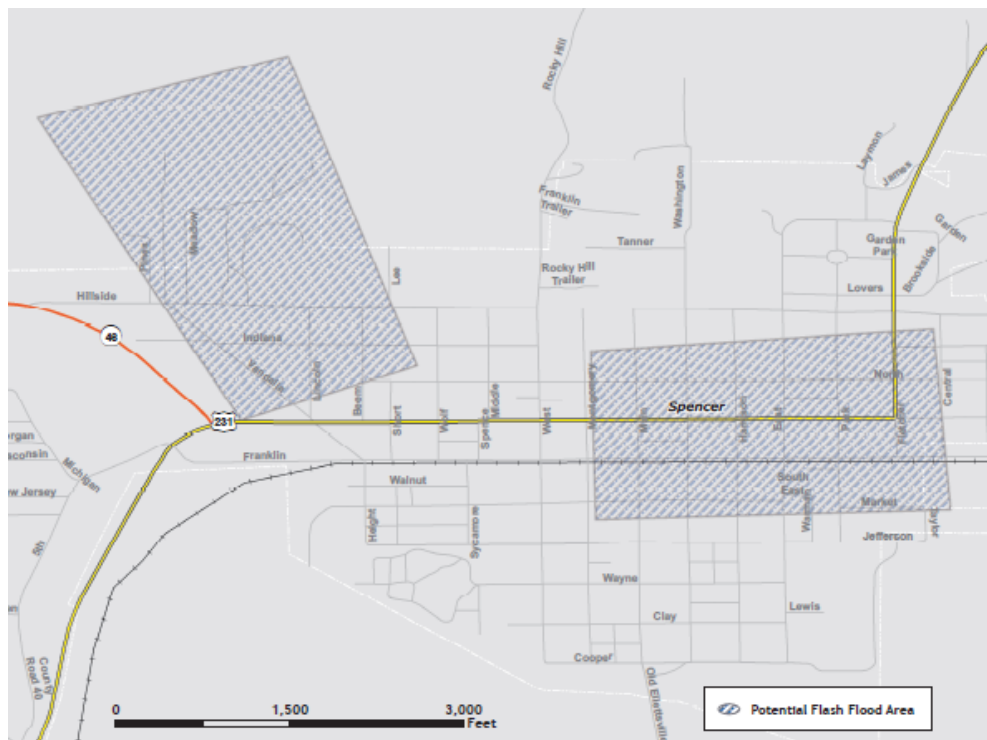
HAZUS-MH estimates that no essential facilities would experience damage in a 100-year flood event.

Infrastructure

The types of infrastructure that could be impacted by a flood include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available for this plan, it is important to emphasize that any number of these items could become damaged in the event of a flood. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); or railway failure from broken or impassable railways. Bridges could fail or become impassable, causing a traffic risk.

Vulnerability Analysis for Flash Flooding

Owen County provided information about areas where flash flooding is a concern. These areas were digitized and are represented in Figure 4-7 and Figure 4-8.

Figure 4-7: Potential Flash Flood Areas in Owen County**Figure 4-8: Potential Flash Flood Areas in Spencer**

Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Vulnerability Analysis for Dam and Levee Failure

An EAP is required to assess the effect of dam failure on these communities. In order to be considered creditable flood protection structures on FEMA's flood maps, levee owners must provide documentation to prove the levee meets design, operation and maintenance standards for protection against the "one-percent-annual chance" flood.

Vulnerability to Future Assets/Infrastructure for Flooding

Flash flooding may affect nearly every location within the county; therefore all buildings and infrastructure are vulnerable to flash flooding. Currently, the Owen County planning commission reviews new development for compliance with the local zoning ordinance. At this time no construction is planned within the area of the 100-year floodplain. Therefore, there is no new construction which will be vulnerable to a 100-year flood.

Vulnerability to Future Assets/Infrastructure for Dam and Levee Failure

The Owen County planning commission reviews new development for compliance with the local zoning ordinance.

Analysis of Community Development Trends

Areas with recent development within the county may be more vulnerable to drainage issues. Storm drains and sewer systems are usually most susceptible. Damage to these can cause the back up of water, sewage, and debris into homes and basements, causing structural and mechanical damage as well as creating public health hazards and unsanitary conditions. Controlling floodplain development is the key to reducing flood-related damages.

4.4.3 Earthquake Hazard

Hazard Definition for Earthquake Hazard

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together unable to release the accumulating energy. When the accumulated energy grows strong enough the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates, as is the case for seismic zones in the Midwestern United States. The most seismically active area is referred to as the New Madrid Seismic Zone. Scientists have learned that the New Madrid fault system may not be the only fault system in the Central U.S. capable of producing damaging earthquakes. The Wabash Valley fault system in Illinois and Indiana shows evidence of large earthquakes in its geologic history, and there may be other, as yet unidentified, faults that could produce strong earthquakes.

Ground shaking from strong earthquakes can collapse buildings and bridges; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill and other unstable soil; and trailers and homes not tied to their foundations are at risk because they can be shaken off their mountings during an earthquake. When an earthquake occurs in a populated area it may cause deaths, injuries, and extensive property damage. Magnitude measures the energy released at the source of the earthquake. Magnitude is determined from measurements on seismographs. Intensity measures the strength of shaking produced by the earthquake at a certain location. Intensity is determined from effects on people, human structures, and the natural environment. Tables 4-22 and 4-23 list earthquake magnitudes and their corresponding intensities.

Source: http://earthquake.usgs.gov/learning/topics/mag_vs_int.php

Table 4-22: Abbreviated Modified Mercalli Intensity Scale

| Mercalli Intensity | Description |
|---------------------------|---|
| I | Not felt except by a very few under especially favorable conditions. |
| II | Felt only by a few persons at rest, especially on upper floors of buildings. |
| III | Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated. |
| IV | Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. |
| V | Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop. |
| VI | Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. |
| VII | Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. |

| Mercalli Intensity | Description |
|---------------------------|--|
| VIII | Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. |
| IX | Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. |
| X | Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. |
| XI | Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. |
| XII | Damage total. Lines of sight and level are distorted. Objects thrown into the air. |

Table 4-23: Earthquake Magnitude vs. Modified Mercalli Intensity Scale

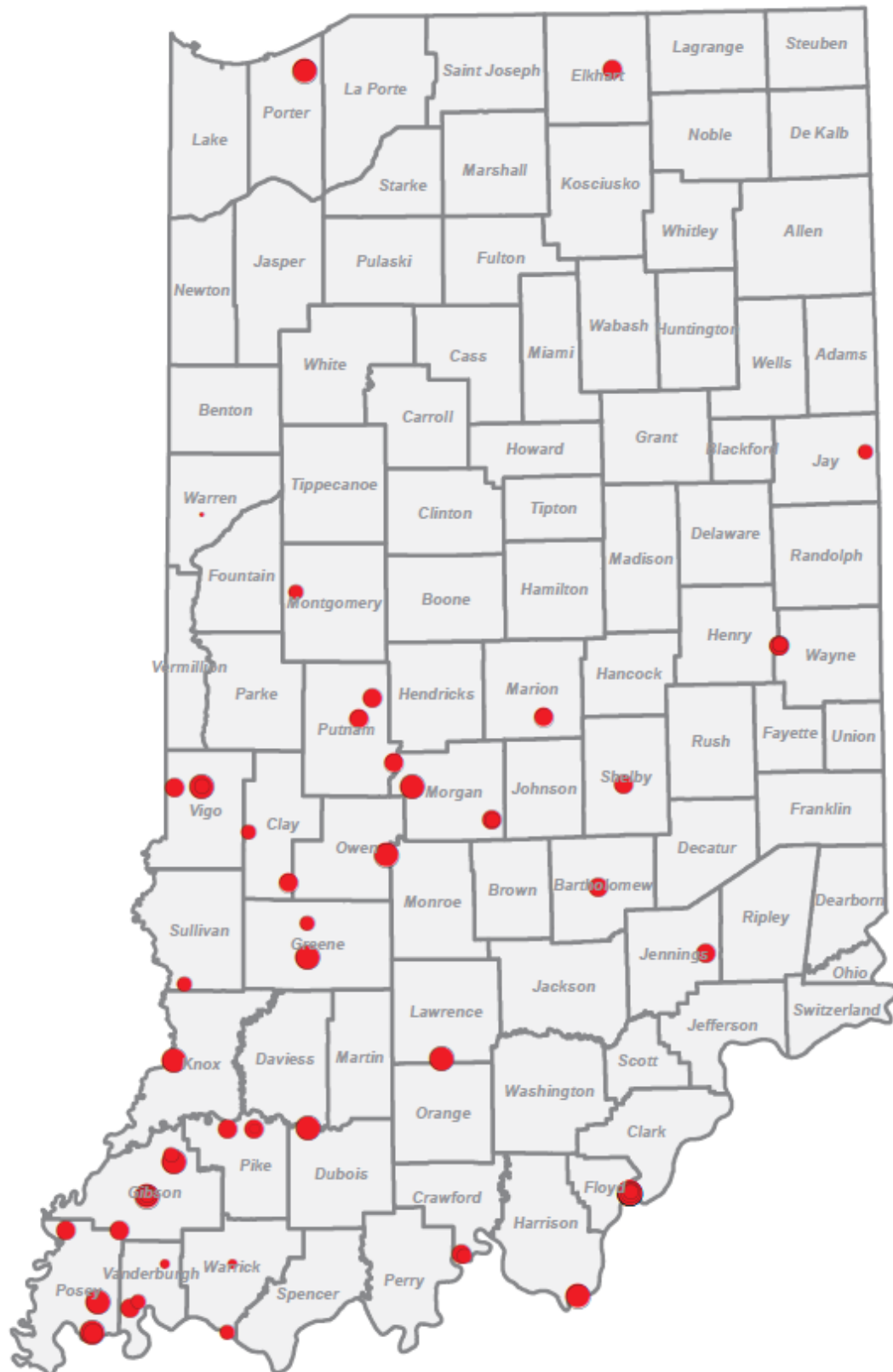
| Earthquake Magnitude | Typical Maximum Modified Mercalli Intensity |
|-----------------------------|--|
| 1.0 - 3.0 | I |
| 3.0 - 3.9 | II - III |
| 4.0 - 4.9 | IV - V |
| 5.0 - 5.9 | VI - VII |
| 6.0 - 6.9 | VII - IX |
| 7.0 and higher | VIII or higher |

Previous Occurrences for Earthquake Hazard

Approximately 40 earthquakes have occurred in Indiana for which reasonably accurate records exist. They vary in Moment Magnitude from a low of approximately M=2.0 to a high of M=5.2. The consensus of opinion among seismologists working in the Midwest is that a magnitude 5.0 to 5.5 event could occur virtually anywhere at any time throughout the region.

The last earthquake recorded in Indiana occurred on September 12, 2004 just north of Shelbyville and measured 3.6 in magnitude. However, in April 2008, a 5.4 magnitude earthquake occurred in southeastern Illinois and was felt throughout most parts of Indiana. The largest prehistoric earthquake documented in the state occurred at Vincennes 6,100 years ago and is known by the size and physical character of sandblows formed during the quake to have had a Moment Magnitude of 7.4.

According to the Indiana Geological Survey, one earthquake was recorded with an epicenter in Owen County. Statewide historical epicenters outside of Owen County are included in Figure 4-9; although information related to the impacts to Owen County from these events is limited.

Figure 4-9: Historical Earthquake Epicenters

The most damaging Indiana earthquake originating within the state occurred on September 27, 1909 near the Indiana border between Vincennes and Terre Haute. Some chimneys fell, several building walls cracked, light connections severed, and pictures shook from the walls. It was felt throughout Indiana and parts of Iowa, Kentucky, Missouri, Arkansas, and probably in parts of Kansas, covering an area of 30,000 square miles.

Another damaging earthquake originating in Indiana occurred on April 29, 1899; it rated intensity VI to VII on the Modified Mercalli Scale. It was strongest in Jeffersonville and Shelbyville, and in Vincennes, chimneys crumbled and walls cracked. It was felt over an area of 40,000 square miles.

In 1876, twin shocks 15 minutes apart were felt over an area of 60,000 square miles. A shock in 1887 centered near Vincennes was felt over 75,000 square miles; an 1891 shock damaged property and frightened people in a church in Evansville.

Indiana has also suffered from damage caused by earthquakes originating in neighboring states. The worst occurred on November 9, 1968, and centered near Dale in southern Indiana. The shock, a magnitude of 5.3, was felt over 580,000 square miles and 23 states including all of Indiana. Intensity VII was reported from Cynthiana, where chimneys cracked, twisted, and toppled; at Fort Branch, where groceries fell from shelves and a loud roaring noise was heard; and in Mount Vernon, New Harmony, Petersburg, Princeton, and Stewartsville, all of which had similar effects. At Poseyville, "Fish jumped out of the rivers, ponds, and lakes."

Almost exactly 10 years earlier on November 7, 1958, an earthquake originating near Mt. Carmel, Indiana causing plaster to fall at Fort Branch. Roaring and whistling noises were heard at Central City, and the residents of Evansville thought there had been in an explosion or plane crash. It was felt over 33,000 square miles of Indiana, Indiana, Missouri, and Kentucky.

On March 2, 1937, a shock centering near Anna, Ohio threw objects from shelves at Fort Wayne and some plaster fell. Six days later, another shock originating at Anna brought pictures crashing down and cracked plaster in Fort Wayne and was strongly felt in Lafayette.

The great New Madrid earthquakes of 1811 and 1812 must have strongly affected the state, particularly the southwestern part, but there is little information available from these frontier times.

[The above history was abridged from Earthquake Information Bulletin, Volume 4, Number 4, July-August 1972.]

1827 Jul 5 11:30 4.8M Intensity VI

Near New Harmony, Indiana (38.0N 87.5W)

The earthquake cracked a brick store at New Harmony, Indiana, and greatly alarmed some people. It was described as violent at New Madrid, Missouri, and severe in St. Louis. It also alarmed many in Cincinnati, Ohio, and Frankfort, Kentucky.

1827 Aug 7 04:30 4.8M Intensity V

Southern Indiana (38.0N 88.0W)

1827 Aug 7 07:00 4.7M Intensity V
Southern Indiana (38.0N 88.0W)

1887 Feb 6 22:15 4.6M Intensity VI

Near Vincennes, Indiana (38.7N 87.5W)

This shock was strongest in southwest Indiana and southeast Illinois. Plaster was shaken from walls in Vincennes, west of Terre Haute, and in Martinsville; a cornice reportedly fell from a building in Huntington, Indiana. It was felt distinctly in Evansville, Indiana, but only slightly in the outskirts of St. Louis, Missouri. The shockwave was also reported in Louisville, Kentucky.

1891 Jul 27 02:28 4.1M Intensity VI

Evansville, Indiana (37.9N 87.5W)

A strong local earthquake damaged a wall on a hotel, broke dishes, and overturned furniture in Evansville. The shock also was strong near Evansville in Mount Vernon, and Newburgh Indiana; and at Hawesville, Henderson, and Owensboro, Kentucky.

1921 Mar 14 12:15 4.4M Intensity VI

Near Terre Haute, Indiana (39.5N 87.5W)

This earthquake broke windows in many buildings and sent residents rushing into the streets in Terre Haute. Small articles were overturned in Paris, Illinois, about 35 km northwest of Terre Haute.

1925 Apr 27 04:05 4.8M Intensity VI

Wabash River valley, near Princeton, Indiana (38.2N 87.8W)

Chimneys were downed in Princeton and in Carmi, Indiana; 100 km southwest chimneys were broken in Louisville, Kentucky. Crowds fled from the theaters in Evansville, Indiana. The affected area included parts of Indiana, Illinois, Kentucky, Missouri, and Ohio.

The above text was taken from <http://earthquake.usgs.gov/regional/states/indiana/history.php>

Geographic Location for Earthquake Hazard

Owen County occupies a region susceptible to one earthquake threat: the threat of an earthquake along the Wabash Valley Fault System. Return periods for large earthquakes within the New Madrid System are estimated to be 500 years; moderate quakes between magnitude 5.5 and 6.0 can recur within approximately 150 years or less. The Wabash Valley Fault System is a sleeper that threatens the southwest quadrant of the state and may generate an earthquake large enough to cause damage as far north and east as Owen County.

Hazard Extent for Earthquake Hazard

The extent of the earthquake is countywide. One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils data. A National Earthquake Hazards Reduction Program (NEHRP) compliant soils map was used for the analysis which was provided by IGS. The map identifies the soils most susceptible to failure.

Calculated Priority Risk Index for Earthquake Hazard

Based on historical information as well as current USGS and IGS research and studies, future earthquakes in Owen County are possible. According to the CPRI, earthquake is ranked as the number five hazard along with transportation hazardous material release.

CPRI = Probability X .45 + Magnitude/Severity X .30 + Warning Time X .15 + Duration of event X .10.

| | | | | | | | | |
|-------------|---|---------------------|---|--------------|---|----------|---|------|
| Probability | + | Magnitude /Severity | + | Warning Time | + | Duration | = | CPRI |
| 2 x .45 | + | 2 x .30 | + | 4 x .15 | + | 2 x .10 | = | 2.3 |

Vulnerability Analysis for Earthquake Hazard

This hazard could impact the entire jurisdiction equally; therefore, the entire county's population and all buildings are vulnerable to an earthquake and can expect the same impacts within the affected area. To accommodate this risk this plan will consider all buildings located within the county as vulnerable.

Critical Facilities

All critical facilities are vulnerable to earthquakes. A critical facility would encounter many of the same impacts as any other building within the county. These impacts include structural failure and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). A complete list of all of the critical facilities, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-9. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure and loss of building function which could result in indirect impacts (e.g. damaged homes will no longer be habitable causing residents to seek shelter).

Infrastructure

During an earthquake the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available to this plan it is important to emphasize that any number of these items could become damaged in the event of an earthquake. The impacts to these items include broken, failed or impassable roadways, broken or failed utility lines (e.g. loss of power or gas to community), and railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic. Typical scenarios are described to gauge the anticipated impacts of earthquakes in the county in terms of numbers and types of buildings and infrastructure.

The Polis team contacted IGS to obtain existing geological information. Four earthquake scenarios—two based on deterministic scenarios and two based on probabilistic scenarios—were developed to provide a reasonable basis for earthquake planning in Owen County. The first deterministic scenario was a 7.1 magnitude epicenter along the Wabash Valley fault zone. Shake maps provided by FEMA were used in HAZUS-MH to estimate losses for Owen County based on this event. Note that a deterministic scenario, in this context, refers to hazard or risk models based on specific scenarios without explicit consideration of the probability of their occurrences.

The second deterministic scenario was a Moment Magnitude of 5.5 with the epicenter located in Owen County. This scenario was selected based on the opinion of the IGS stating it could occur in the selected location and that it would therefore represent a realistic scenario for planning purposes.

Additionally, the analysis included two different types of probabilistic scenarios. These types of scenarios are based on ground shaking parameters derived from U.S. Geological Survey probabilistic seismic hazard curves. The first selected probabilistic scenario was a 500-year return period scenario. This scenario evaluates the average impacts of a multitude of possible earthquake epicenters with a magnitude that would be typical of that expected for a 500-year return period. The second probabilistic scenario allowed calculation of annualized loss. The annualized loss analysis in HAZUS-MH provides a means for averaging potential losses from future scenarios while considering their probabilities of occurrence. The HAZUS-MH earthquake model evaluates eight different return period scenarios including those for the 100-, 250-, 500-, 750-, 1000-, 1500-, 2000-, and 2500-year return period earthquake events. HAZUS-MH then calculates the probabilities of these events as well as the interim events, calculates their associated losses, and sums these losses to calculate an annualized loss. These analysis options were chosen because they are useful for prioritization of seismic reduction measures and for simulating mitigation strategies.

The following earthquake hazard modeling scenarios were performed:

- 7.1 magnitude earthquake on the Wabash Valley Fault System
- 5.5 magnitude earthquake local epicenter
- 500-year return period event
- Annualized loss

Modeling a deterministic scenario requires user input for a variety of parameters. One of the most critical sources of information that is required for accurate assessment of earthquake risk is soils data. Fortunately, a National Earthquake Hazards Reduction Program (NEHRP) soil classification map exists for Indiana. NEHRP soil classifications portray the degree of shear-wave amplification that can occur during ground shaking. The IGS supplied soils map was used for the analysis. FEMA provided a map for liquefaction potential that was used by HAZUS-MH.

An earthquake depth of 10.0 kilometers was selected based on input from IGS. HAZUS-MH also requires the user to define an attenuation function unless ground motion maps are supplied. Because Owen County has experienced smaller earthquakes, the decision was made to use the Central Eastern United States (CEUS) attenuation function. The probabilistic return period analysis and the annualized loss analysis do not require user input.

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

Results for 7.1 Magnitude Earthquake Wabash Valley Scenario

The results of the 7.1 Wabash Valley earthquake are depicted in Table 4-24, Table 4-25, and Figure 4-10. HAZUS-MH estimates that approximately seven buildings will be at least moderately damaged. It is estimated that no buildings will be damaged beyond repair.

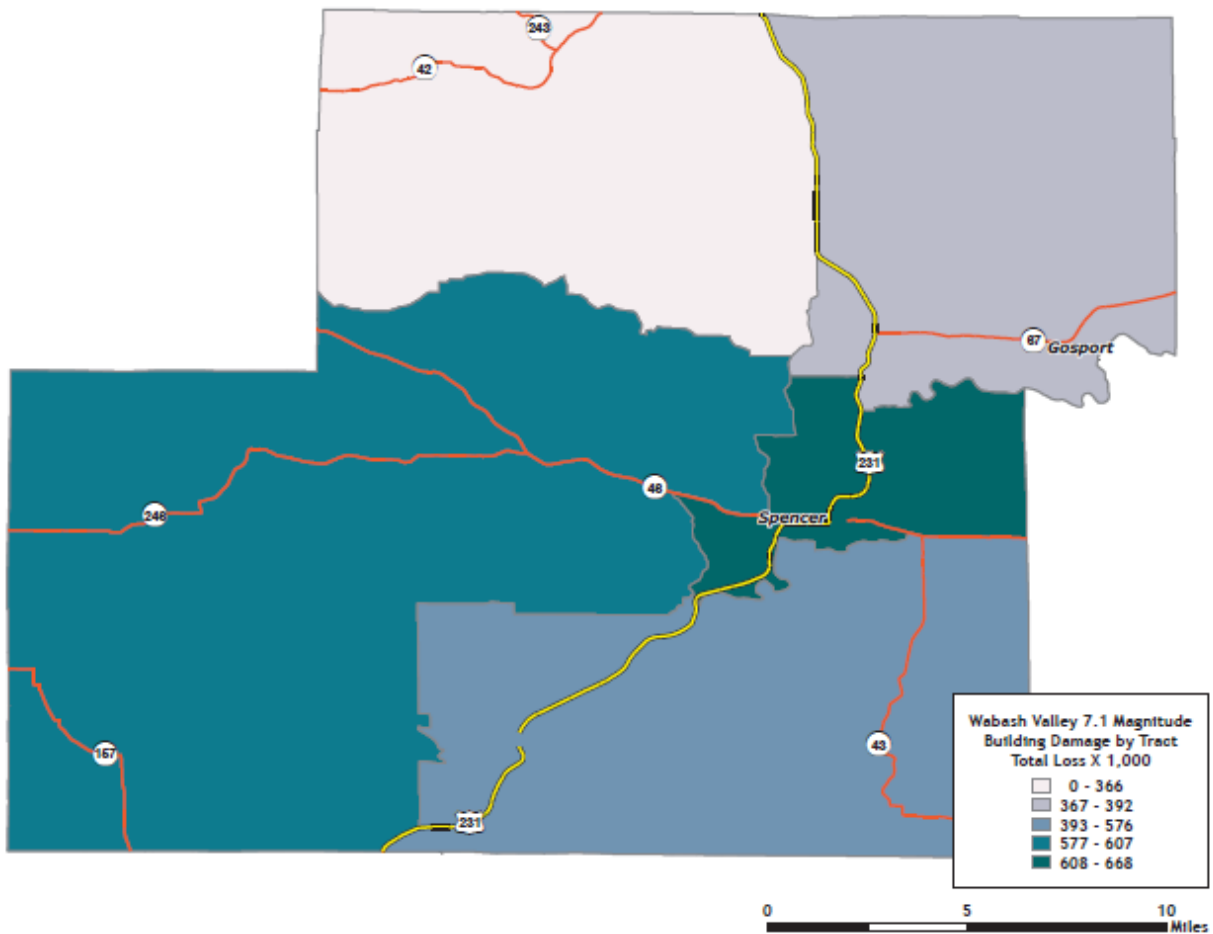
The total building related losses totaled \$2.61 million; none of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up more than 34% of the total loss.

Table 4-24: Wabash Valley Scenario-Damage Counts by Building Occupancy

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|-------------------|--------------|-------|------------|-------|----------|-------|-----------|------|----------|------|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Agriculture | 3,145 | 32.79 | 33 | 32.74 | 3 | 39.73 | 0 | 0.00 | 0 | 0.00 |
| Commercial | 242 | 2.52 | 2 | 2.17 | 0 | 2.32 | 0 | 0.00 | 0 | 0.00 |
| Education | 6 | 0.06 | 0 | 0.06 | 0 | 0.07 | 0 | 0.00 | 0 | 0.00 |
| Government | 41 | 0.42 | 0 | 0.40 | 0 | 0.44 | 0 | 0.00 | 0 | 0.00 |
| Industrial | 44 | 0.45 | 0 | 0.43 | 0 | 0.53 | 0 | 0.00 | 0 | 0.00 |
| Other Residential | 1,655 | 17.26 | 43 | 41.75 | 3 | 35.76 | 0 | 0.00 | 0 | 0.00 |
| Religion | 129 | 1.35 | 2 | 1.48 | 0 | 1.63 | 0 | 0.00 | 0 | 0.00 |
| Single Family | 4,329 | 45.14 | 21 | 20.96 | 1 | 19.53 | 0 | 0.00 | 0 | 0.00 |
| Total | 9,590 | | 102 | | 7 | | 0 | | 0 | |

Table 4-25: Wabash Valley Scenario-Building Economic losses in Millions of Dollars

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|-----------------------------|-----------------|---------------|-------------------|-------------|-------------|-------------|-------------|
| Income Losses | | | | | | | |
| | Wage | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Capital-Related | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Rental | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| | Relocation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Subtotal | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 |
| Capital Stock Losses | | | | | | | |
| | Structural | 0.01 | 0.01 | 0.00 | 0.00 | 0.04 | 0.06 |
| | Non_Structural | 0.40 | 0.12 | 0.09 | 0.06 | 0.69 | 1.36 |
| | Content | 0.29 | 0.05 | 0.08 | 0.03 | 0.62 | 1.07 |
| | Inventory | 0.00 | 0.00 | 0.01 | 0.01 | 0.09 | 0.10 |
| | Subtotal | 0.70 | 0.18 | 0.18 | 0.11 | 1.44 | 2.60 |
| | Total | 0.70 | 0.18 | 0.18 | 0.11 | 1.44 | 2.61 |

Figure 4-10: Wabash Valley Scenario-Building Economic Losses in Thousands of Dollars

Wabash Valley Scenario—Essential Facility Losses

Before the earthquake, the region had 560 care beds available for use. On the day of the earthquake, the model estimates that only 280 care beds (50%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 97% of the beds will be back in service. By day 30, 100% will be operational.

Results for 5.5 Magnitude Earthquake in Owen County

The results of the initial analysis, the 5.5 magnitude earthquake with an epicenter in the center of Owen County, are depicted in Table 4-26 and 4-27 and Figure 4-11. HAZUS-MH estimates that approximately 1,148 buildings will be at least moderately damaged. This is more than 12% of the total number of buildings in the region. It is estimated that 26 buildings will be damaged beyond repair.

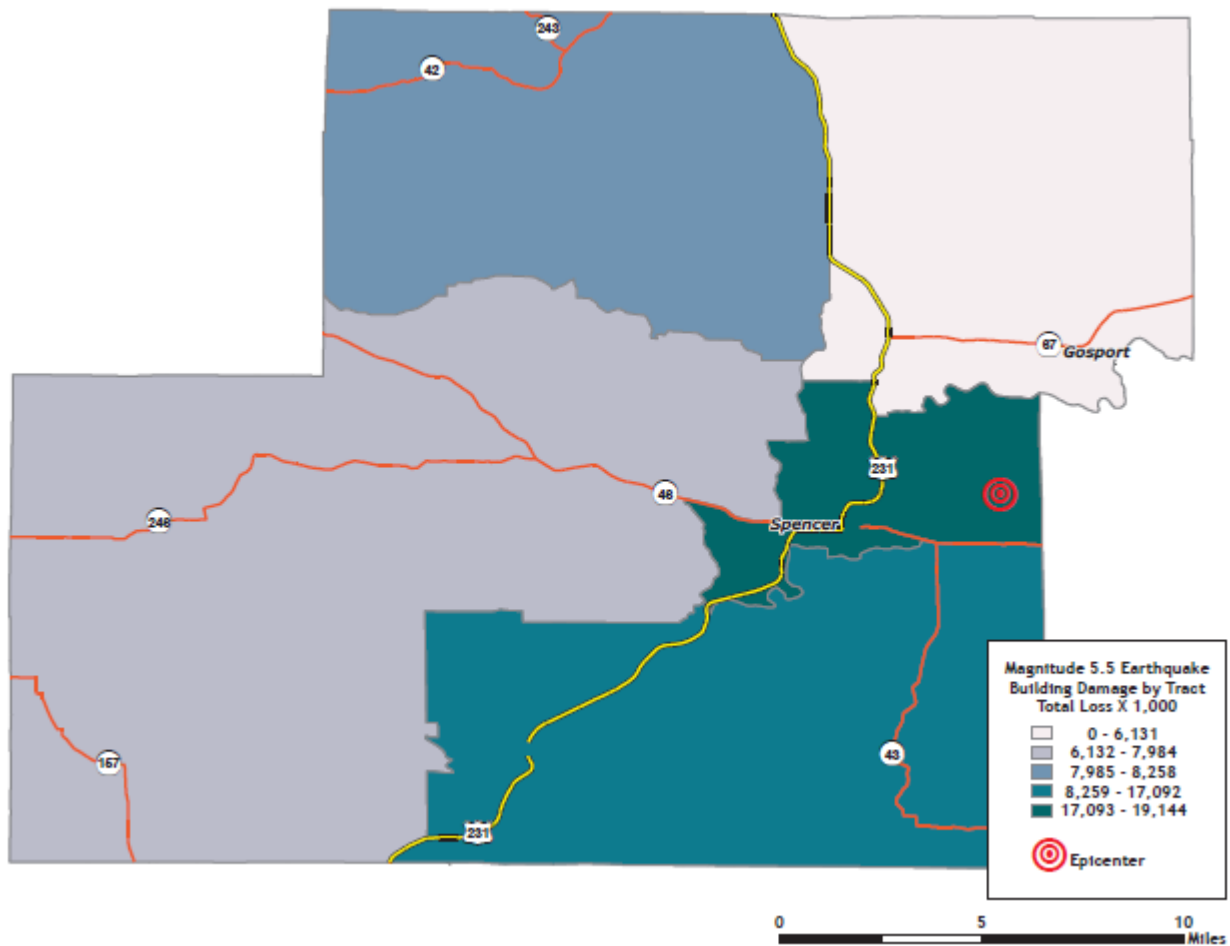
The total building related losses totaled \$45.29 million; 4% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which comprised more than 39% of the total loss.

Table 4-26: Owen County 5.5M Scenario-Damage Counts by Building Occupancy

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|-------------------|--------------|-------|--------------|-------|------------|-------|------------|-------|-----------|-------|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Agriculture | 2,174 | 31.39 | 508 | 31.25 | 375 | 40.76 | 110 | 54.84 | 14 | 52.53 |
| Commercial | 179 | 2.58 | 37 | 2.29 | 22 | 2.36 | 6 | 2.77 | 1 | 2.76 |
| Education | 4 | 0.06 | 1 | 0.06 | 1 | 0.07 | 0 | 0.08 | 0 | 0.13 |
| Government | 31 | 0.45 | 6 | 0.35 | 3 | 0.37 | 1 | 0.38 | 0 | 0.53 |
| Industrial | 30 | 0.44 | 7 | 0.43 | 5 | 0.56 | 2 | 0.76 | 0 | 0.72 |
| Other Residential | 1,096 | 15.83 | 331 | 20.37 | 243 | 26.35 | 29 | 14.18 | 2 | 6.08 |
| Religion | 91 | 1.31 | 22 | 1.36 | 14 | 1.48 | 4 | 1.90 | 1 | 2.52 |
| Single Family | 3,321 | 47.95 | 714 | 43.89 | 258 | 28.05 | 50 | 25.08 | 9 | 34.73 |
| Total | 6,925 | | 1,626 | | 921 | | 201 | | 26 | |

Table 4-27: Owen County 5.5M Scenario-Building Economic Losses in Millions of Dollars

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|-----------------------------|-----------------|---------------|-------------------|-------------|-------------|--------------|--------------|
| Income Losses | | | | | | | |
| | Wage | 0.00 | 0.05 | 0.28 | 0.02 | 0.20 | 0.54 |
| | Capital-Related | 0.00 | 0.02 | 0.28 | 0.01 | 0.14 | 0.45 |
| | Rental | 0.34 | 0.05 | 0.33 | 0.02 | 0.12 | 0.86 |
| | Relocation | 0.04 | 0.00 | 0.02 | 0.00 | 0.04 | 0.10 |
| | Subtotal | 0.37 | 0.12 | 0.90 | 0.06 | 0.50 | 1.95 |
| Capital Stock Losses | | | | | | | |
| | Structural | 1.35 | 0.39 | 0.26 | 0.09 | 4.97 | 7.05 |
| | Non_Structural | 8.40 | 1.61 | 1.39 | 0.96 | 8.24 | 20.60 |
| | Content | 4.82 | 0.56 | 1.19 | 0.59 | 7.34 | 14.49 |
| | Inventory | 0.00 | 0.00 | 0.09 | 0.16 | 0.96 | 1.20 |
| | Subtotal | 14.56 | 2.55 | 2.92 | 1.80 | 21.50 | 43.34 |
| | Total | 14.94 | 2.68 | 3.82 | 1.85 | 22.00 | 45.29 |

Figure 4-11: Owen County 5.5M Scenario-Building Economic Losses in Thousands of Dollars

Owen County 5.5M Scenario—Essential Facility Losses

Before the earthquake, the region had 560 care beds available for use. On the day of the earthquake, the model estimates that only 19 care beds (3%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 46% of the beds will be back in service. By day 30, 75% will be operational.

Results 5.0 Magnitude 500-Year Probabilistic Scenario

The results of the 500-year probabilistic analysis are depicted in Table 4-28 and 4-29. HAZUS-MH estimates that approximately 537 buildings will be at least moderately damaged. This is more than 6% of the total number of buildings in the region. It is estimated that five buildings will be damaged beyond repair. The total building-related losses totaled \$7.14 million; 8% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up more than 32% of the total loss.

Table 4-28: 500-Year Probabilistic Scenario-Damage Counts by Building Occupancy

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|-------------------|--------------|-------|------------|-------|------------|-------|-----------|-------|----------|-------|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Agriculture | 2,571 | 31.07 | 354 | 39.85 | 209 | 45.50 | 44 | 61.11 | 3 | 56.85 |
| Commercial | 216 | 2.61 | 18 | 2.08 | 8 | 1.80 | 2 | 2.11 | 0 | 2.07 |
| Education | 5 | 0.06 | 1 | 0.06 | 0 | 0.06 | 0 | 0.06 | 0 | 0.06 |
| Government | 36 | 0.43 | 3 | 0.38 | 2 | 0.35 | 0 | 0.33 | 0 | 0.56 |
| Industrial | 38 | 0.45 | 4 | 0.43 | 2 | 0.46 | 0 | 0.59 | 0 | 0.51 |
| Other Residential | 1,281 | 15.48 | 244 | 27.51 | 161 | 35.16 | 13 | 18.07 | 1 | 10.35 |
| Religion | 114 | 1.38 | 10 | 1.18 | 5 | 1.11 | 1 | 1.40 | 0 | 1.89 |
| Single Family | 4,014 | 48.51 | 253 | 28.52 | 71 | 15.56 | 12 | 16.33 | 2 | 27.68 |
| Total | 8,275 | | 887 | | 459 | | 73 | | 5 | |

Table 4-29: 500-Year Probabilistic Scenario-Building Economic Losses in Millions of Dollars

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|-----------------------------|-----------------|---------------|-------------------|-------------|-------------|-------------|-------------|
| Income Losses | | | | | | | |
| | Wage | 0.00 | 0.01 | 0.08 | 0.00 | 0.07 | 0.16 |
| | Capital-Related | 0.00 | 0.00 | 0.08 | 0.00 | 0.05 | 0.14 |
| | Rental | 0.08 | 0.01 | 0.11 | 0.01 | 0.04 | 0.25 |
| | Relocation | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.03 |
| | Subtotal | 0.09 | 0.02 | 0.28 | 0.01 | 0.17 | 0.57 |
| Capital Stock Losses | | | | | | | |
| | Structural | 0.34 | 0.24 | 0.08 | 0.02 | 2.15 | 2.83 |
| | Non_Structural | 0.89 | 0.43 | 0.11 | 0.04 | 1.09 | 2.54 |
| | Content | 0.21 | 0.04 | 0.05 | 0.02 | 0.75 | 1.07 |
| | Inventory | 0.00 | 0.00 | 0.01 | 0.01 | 0.11 | 0.12 |
| | Subtotal | 1.44 | 0.71 | 0.24 | 0.08 | 4.10 | 6.57 |
| | Total | 1.53 | 0.73 | 0.52 | 0.09 | 4.27 | 7.14 |

500-Year Probabilistic Scenario—Essential Facility Losses

Before the earthquake, the region had 560 care beds available for use. On the day of the earthquake, the model estimates that only 158 care beds (28%) are available for use by patients already in medical care facilities and those injured by the earthquake. After one week, 90% of the beds will be back in service. By day 30, 98% will be operational.

Results Annualized Risk Scenario

HAZUS-MH estimates that approximately 495 buildings will be at least moderately damaged. This is more than 5% of the total number of buildings in the region. It is estimated that there will be no buildings damaged beyond repair.

Vulnerability to Future Assets/Infrastructure for Earthquake Hazard

New construction, especially critical facilities, will accommodate earthquake mitigation design standards. The town of Spencer, in particular, must mitigate the potential consequences of an

earthquake, as more than 75% of the town is built on alluvial soils with a high water table. Furthermore, two bridges in Spencer, one bridge south of Gosport, and one in Freedom would seriously impede traffic and the movement of supplies and people if damaged in an earthquake. Other at-risk areas include the glacial lake bed areas of Flat Woods and Quincy Lake Bed.

Analysis of Community Development Trends

Community development will occur outside of the low lying areas in floodplains with a water table within five feet of grade which are susceptible to liquefaction. In Meeting #4, on April 29, 2009, the planning team discussed potential mitigation strategies specific to earthquakes. The strategies are detailed in Section 5.

4.4.4 Thunderstorm Hazard

Hazard Definition for Thunderstorm Hazard

Severe thunderstorms are defined as thunderstorms with one or more of the following characteristics: strong winds, large damaging hail, or frequent lightning. Severe thunderstorms most frequently occur in Indiana during the spring and summer months, but can occur any month of the year at any time of day. A severe thunderstorm's impacts can be localized or can be widespread in nature. A thunderstorm is classified as severe when it meets one or more of the following criteria.

- Hail of diameter 0.75 inches or higher
- Frequent and dangerous lightning
- Wind speeds equal to or greater than 58 mph

Hail

Hail is a product of a strong thunderstorm. Hail usually falls near the center of a storm, however strong winds occurring at high altitudes in the thunderstorm can blow the hailstones away from the storm center, resulting in damage in other areas near the storm. Hailstones range from pea-sized to baseball-sized, but hailstones larger than softballs have been reported on rare occasion.

Lightning

Lightning is a discharge of electricity from a thunderstorm. Lightning is often perceived as a minor hazard, but in reality lightning causes damage to many structures and kills or severely injures numerous people in the United States each year.

Severe Winds (Straight-Line Winds)

Straight-line winds from thunderstorms are a fairly common occurrence across Indiana. Straight-line winds can cause damage to homes, businesses, power lines, and agricultural areas, and may require temporary sheltering of individuals who are without power for extended periods of time.

Previous Occurrences for Thunderstorm Hazard

The NCDC database reported 32 hailstorms in Owen County since 1950. Hailstorms occur nearly every year in the late spring and early summer months.

The most recent significant occurrence was in October 2007. Nickel size hail fell on US 231 10 miles north of Spencer, which is just west of Devore in Owen County. Isolated severe weather occurred during the early evening hours of October 17, 2007 in Owen County. The main threat from the storms was hail.

The Owen County hailstorms are identified in Table 4-30. Additional details for NCDC events are included in Appendix D.

Table 4-30: Owen County Hailstorms*

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|------------|------|-----------|--------|----------|-----------------|-------------|
| Owen | 4/21/1967 | Hail | 0.00 in. | 0 | 0 | 0 | 0 |
| Owen | 3/20/1976 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| Owen | 5/12/1980 | Hail | 1.50 in. | 0 | 0 | 0 | 0 |
| Owen | 11/22/1992 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Spencer | 8/9/1995 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Spencer | 5/23/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Freedom | 6/28/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Spencer | 6/28/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Freeman | 5/17/1999 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Carp | 8/18/2001 | Hail | 1.25 in. | 0 | 0 | 0 | 0 |
| Spencer | 8/18/2001 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Freedom | 11/10/2002 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Freedom | 11/10/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Spencer | 5/9/2003 | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| Spencer | 7/9/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Spencer | 8/18/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| Quincy | 5/13/2005 | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| Gosport | 11/6/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| Cunot | 3/31/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| Spencer | 6/19/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| Spencer | 6/19/2006 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| Gosport | 6/19/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| Gosport | 6/19/2006 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| Spencer | 6/19/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| Spencer | 6/22/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| Spencer | 4/3/2007 | Hail | 0.75 in. | 0 | 0 | OK | OK |
| Freedom | 4/3/2007 | Hail | 0.75 in. | 0 | 0 | OK | OK |
| Southport | 4/3/2007 | Hail | 0.75 in. | 0 | 0 | OK | OK |
| Spencer | 4/3/2007 | Hail | 1.00 in. | 0 | 0 | OK | OK |
| Devore | 10/17/2007 | Hail | 0.88 in. | 0 | 0 | OK | OK |
| Spencer | 6/4/2008 | Hail | 1.00 in. | 0 | 0 | OK | OK |
| Spencer | 6/4/2008 | Hail | 1.00 in. | 0 | 0 | OK | OK |

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

The NCDC database reported one occurrence of a significant lightning strike in Owen County since 1950. For example, a house was burned to the ground after getting struck by lightning.

The Owen County lightning strikes are identified in Table 4-31. Additional details for NCDC events are included in Appendix D. Lightning occurs in Owen County every year. The following list only represents those events which were recorded by the NCDC.

Table 4-31: Owen County Lightning Strikes*

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|----------|-----------|-----------|--------|----------|-----------------|-------------|
| Quincy | 7/4/2000 | Lightning | N/A | 0 | 0 | 100K | 0 |

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

The NCDC database identified 95 wind storms reported since 1950.

For example, in June 2006, trees were downed in Spencer. A series of damaging wind-producing severe thunderstorms moved through central Indiana on the evening of June 17, 2006. Fortunately, damage was mostly confined to downed trees and power lines.

As shown in Table 4-32, wind storms have historically occurred year-round with the greatest frequency and damage between May and July. The following table includes available top wind speeds for Owen County.

Table 4-32: Owen County Wind Storms*

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|------------|------------|-----------|--------|----------|-----------------|-------------|
| Spencer | 8/30/2005 | Heavy Rain | N/A | 0 | 0 | 0 | 0 |
| Spencer | 6/22/2006 | Heavy Rain | N/A | 0 | 0 | 0 | 0 |
| Owen | 11/21/1994 | High Wind | 0 kts. | 0 | 0 | 50K | 0 |
| Owen | 11/27/1994 | High Wind | 0 kts. | 0 | 0 | 120K | 0 |
| Owen | 1/18/1996 | High Wind | 60 kts. | 0 | 0 | 22K | 0 |
| Owen | 4/6/1997 | High Wind | 49 kts. | 0 | 0 | 0 | 0 |
| Jordan | 4/3/2007 | Tstm Wind | 60 kts. | 0 | 0 | 30K | 0K |
| Spencer | 6/27/2007 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K |
| Spencer | 1/29/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K |
| Owen | 6/19/1994 | Tstm Winds | 0 kts. | 0 | 0 | 5K | 0 |
| Owen | 4/18/1995 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Gosport | 8/9/1995 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 4/21/1967 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 8/8/1977 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 8/8/1977 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 6/20/1979 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 6/19/1980 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 6/19/1980 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 6/28/1980 | Tstm Winds | 60 kts. | 0 | 0 | 0 | 0 |
| Owen | 8/2/1980 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 4/3/1982 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 5/31/1982 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 8/29/1985 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|------------|------------|-----------|--------|----------|-----------------|-------------|
| Owen | 8/30/1985 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 3/10/1986 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 3/10/1986 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 7/25/1986 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 7/25/1986 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 5/20/1987 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 5/30/1987 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 6/13/1987 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 6/13/1987 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 8/3/1988 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 8/23/1989 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 5/9/1990 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 5/16/1990 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 8/29/1990 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 11/30/1991 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Cunot | 4/19/1996 | Tstm Winds | 55 kts. | 0 | 0 | 0 | 0 |
| Spencer | 5/8/1996 | Tstm Winds | 0 kts. | 0 | 0 | 3K | 0 |
| Gosport | 8/15/1996 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Deans Hill | 8/15/1996 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 |
| Owen | 7/14/1997 | Tstm Winds | 0 kts. | 0 | 0 | 1K | 0 |
| Spencer | 6/28/1998 | Tstm Winds | 0 kts. | 0 | 0 | 1K | 0 |
| Owen | 6/29/1998 | Tstm Winds | 0 kts. | 0 | 0 | 3K | 0 |
| Owen | 11/10/1998 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Coal City | 12/6/1998 | Tstm Winds | 55 kts. | 0 | 0 | 10K | 0 |
| Gosport | 5/17/1999 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Gosport | 5/17/1999 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Cunot | 5/17/1999 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 5/17/1999 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Carp | 6/1/1999 | Tstm Winds | 55 kts. | 0 | 0 | 10K | 0 |
| Spencer | 4/20/2000 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Cataract | 8/6/2000 | Tstm Winds | 50 kts. | 0 | 0 | 50K | 0 |
| Southport | 9/20/2000 | Tstm Winds | 60 kts. | 0 | 1 | 20K | 0 |
| Gosport | 6/5/2001 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 6/19/2001 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Gosport | 8/18/2001 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 10/24/2001 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 6/1/2002 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Devore | 6/15/2002 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 7/22/2002 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 7/29/2002 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Gosport | 9/20/2002 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 5/28/2003 | Tstm Winds | 60 kts. | 0 | 0 | 0 | 0 |
| Spencer | 7/21/2003 | Tstm Winds | 55 kts. | 0 | 5 | 0 | 0 |
| Quincy | 6/13/2004 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Carp | 7/3/2004 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|------------|------------|-----------|--------|----------|-----------------|-------------|
| Spencer | 7/13/2004 | Tstm Winds | 50 kts. | 0 | 0 | 10K | 0 |
| Gosport | 7/13/2004 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 7/22/2004 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 8/18/2004 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Freedom | 8/24/2004 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 5/19/2005 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Cataract | 5/19/2005 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Arney | 6/5/2005 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 6/30/2005 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 11/6/2005 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 11/15/2005 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 4/2/2006 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 4/2/2006 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Gosport | 4/14/2006 | Tstm Winds | 50 kts. | 0 | 0 | 2K | 0 |
| Spencer | 6/17/2006 | Tstm Winds | 50 kts. | 0 | 0 | 0 | 0 |
| Spencer | 6/4/2008 | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0K |
| Southport | 6/4/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K |
| Southport | 6/4/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K |
| Carp | 6/4/2008 | Tstm Wind | 56 kts. | 0 | 0 | 0K | 0K |
| Carp | 6/4/2008 | Tstm Wind | 56 kts. | 0 | 0 | 0K | 0K |
| Patrickburg | 6/27/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K |
| Gosport | 6/27/2008 | Tstm Wind | 55 kts. | 0 | 0 | 0K | 0K |
| Gosport | 6/27/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K |
| Freedom | 6/6/2008 | Heavy Rain | N/A | 0 | 0 | 0K | 0K |
| Romona | 6/6/2008 | Heavy Rain | N/A | 0 | 0 | 0K | 0K |
| Spencer | 6/6/2008 | Heavy Rain | N/A | 0 | 0 | 0K | 0K |
| Spencer | 6/6/2008 | Heavy Rain | N/A | 0 | 0 | 0K | 0K |

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

Geographic Location for Thunderstorm Hazard

The entire county has the same risk for occurrence of thunderstorms. They can occur at any location within the county.

Hazard Extent for Thunderstorm Hazard

The extent of the historical thunderstorms varies in terms of the extent of the storm, the wind speed, and the size of hail stones. Thunderstorms can occur at any location within the county.

Calculated Priority Risk Index for Thunderstorm Hazard

Based on historical information, the probability of future high wind damage is highly likely. High winds with widely varying magnitudes are expected to happen. According to the CPRI, thunderstorms and high wind damage ranked as the number three hazard.

CPRI = Probability X .45 + Magnitude/Severity X .30 + Warning Time X .15 + Duration of event X .10.

| | | | | | | | | |
|-------------|---|---------------------|---|--------------|---|----------|---|------|
| Probability | + | Magnitude /Severity | + | Warning Time | + | Duration | = | CPRI |
| 4 x .45 | + | 2 x .30 | + | 4 x .15 | + | 1 x .10 | = | 3.1 |

Vulnerability Analysis for Thunderstorm Hazard

Severe thunderstorms are an equally distributed threat across the entire jurisdiction; therefore, the entire county's population and all buildings are vulnerable to a severe thunderstorm and can expect the same impacts within the affected area. This plan will therefore consider all buildings located within the county as vulnerable. The existing buildings and infrastructure in Owen County are discussed in Table 4-9.

Critical Facilities

All critical facilities are vulnerable to severe thunderstorms. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, fires caused by lightning and loss of function of the facility (e.g. a damaged police station will no longer be able to serve the community). Table 4-8 lists the types and numbers of all of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is provided in Table 4-9. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure, debris (trees or limbs) causing damage, roofs blown off or windows broken by hail or high winds, fires caused by lightning, and loss of building functionality (e.g. a damaged home will no longer be habitable causing residents to seek shelter).

Infrastructure

During a severe thunderstorm the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable it is important to emphasize that any number of these items could become damaged during a severe thunderstorm. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); or

railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

Potential Dollar Losses for Thunderstorm Hazard

A HAZUS-MH analysis was not completed for thunderstorms because the widespread extent of such a hazard makes it difficult to accurately model outcomes.

To determine dollar losses for a thunderstorm hazard, the available NCDC hazard information was condensed to include only thunderstorm hazards that occurred within the past ten years. Owen County's MHMP team then reviewed the property damages reported to NCDC and made any applicable updates.

It was determined that since 1998, Owen County has incurred \$246,000 in damages relating to thunderstorms, including hail, lightning, and high winds. The resulting information is listed in Table 4-33.

Table 4-33: Owen County Property Damage (1998–2008)

| Location or County | Date | Type | Property Damage |
|----------------------|----------|-----------|-------------------|
| Spencer | 05/23/98 | Hail | \$ - |
| Freedom | 06/28/98 | Hail | \$ - |
| Spencer | 06/28/98 | Hail | \$ - |
| Spencer | 06/28/98 | Tstm Wind | \$ 1,000 |
| Owen | 06/29/98 | Tstm Wind | \$ 3,000 |
| Owen | 11/10/98 | Tstm Wind | \$ - |
| Coal City | 12/06/98 | Tstm Wind | \$ 10,000 |
| 1998 Subtotal | | | \$ 14,000 |
| Freeman | 05/17/99 | Hail | \$ - |
| Gosport | 05/17/99 | Tstm Wind | \$ - |
| Gosport | 05/17/99 | Tstm Wind | \$ - |
| Cunot | 05/17/99 | Tstm Wind | \$ - |
| Spencer | 05/17/99 | Tstm Wind | \$ - |
| Carp | 06/01/99 | Tstm Wind | \$ 10,000 |
| 1999 Subtotal | | | \$ 10,000 |
| Spencer | 04/20/00 | Tstm Wind | \$ - |
| Quincy | 07/04/00 | Lightning | \$ 100,000 |
| Cataract | 08/06/00 | Tstm Wind | \$ 50,000 |
| Southport | 09/20/00 | Tstm Wind | \$ 20,000 |
| 2000 Subtotal | | | \$ 170,000 |
| Gosport | 06/05/01 | Tstm Wind | \$ - |
| Spencer | 06/19/01 | Tstm Wind | \$ - |
| Carp | 08/18/01 | Hail | \$ - |
| Spencer | 08/18/01 | Hail | \$ - |
| Gosport | 08/18/01 | Tstm Wind | \$ - |
| Spencer | 10/24/01 | Tstm Wind | \$ - |
| 2001 Subtotal | | | \$ - |
| Spencer | 06/01/02 | Tstm Wind | \$ - |

| Location or County | Date | Type | Property Damage |
|----------------------|----------|------------|-----------------|
| Devore | 06/15/02 | Tstm Wind | \$ - |
| Spencer | 07/22/02 | Tstm Wind | \$ - |
| Spencer | 07/29/02 | Tstm Wind | \$ - |
| Gosport | 09/20/02 | Tstm Wind | \$ - |
| Freedom | 11/10/02 | Hail | \$ - |
| Freedom | 11/10/02 | Hail | \$ - |
| 2002 Subtotal | | | \$ - |
| Spencer | 05/09/03 | Hail | \$ - |
| Spencer | 05/28/03 | Tstm Wind | \$ - |
| Spencer | 07/09/03 | Hail | \$ - |
| Spencer | 07/21/03 | Tstm Wind | \$ - |
| 2003 Subtotal | | | \$ - |
| Quincy | 06/13/04 | Tstm Wind | \$ - |
| Carp | 07/03/04 | Tstm Wind | \$ - |
| Spencer | 07/13/04 | Tstm Wind | \$ 10,000 |
| Gosport | 07/13/04 | Tstm Wind | \$ - |
| Spencer | 07/22/04 | Tstm Wind | \$ - |
| Spencer | 08/18/04 | Hail | \$ - |
| Spencer | 08/18/04 | Tstm Wind | \$ - |
| Freedom | 08/24/04 | Tstm Wind | \$ - |
| 2004 Subtotal | | | \$ 10,000 |
| Quincy | 05/13/05 | Hail | \$ - |
| Spencer | 05/19/05 | Tstm Wind | \$ - |
| Cataract | 05/19/05 | Tstm Wind | \$ - |
| Arney | 06/05/05 | Tstm Wind | \$ - |
| Spencer | 06/30/05 | Tstm Wind | \$ - |
| Spencer | 08/30/05 | Heavy Rain | \$ - |
| Gosport | 11/06/05 | Hail | \$ - |
| Spencer | 11/06/05 | Tstm Wind | \$ - |
| Spencer | 11/15/05 | Tstm Wind | \$ - |
| 2005 Subtotal | | | \$ - |
| Cunot | 03/31/06 | Hail | \$ - |
| Spencer | 04/02/06 | Tstm Wind | \$ - |
| Spencer | 04/02/06 | Tstm Wind | \$ - |
| Gosport | 04/14/06 | Tstm Wind | \$ 2,000 |
| Spencer | 06/17/06 | Tstm Wind | \$ - |
| Spencer | 06/19/06 | Hail | \$ - |
| Spencer | 06/19/06 | Hail | \$ - |
| Gosport | 06/19/06 | Hail | \$ - |
| Gosport | 06/19/06 | Hail | \$ - |
| Spencer | 06/19/06 | Hail | \$ - |
| Spencer | 06/22/06 | Hail | \$ - |
| Spencer | 06/22/06 | Heavy Rain | \$ - |
| 2006 Subtotal | | | \$ 2,000 |
| Spencer | 04/03/07 | Hail | \$ - |
| Freedom | 04/03/07 | Hail | \$ - |
| Southport | 04/03/07 | Hail | \$ - |

| Location or County | Date | Type | Property Damage |
|------------------------------|----------|------------|-----------------|
| Spencer | 04/03/07 | Hail | \$ - |
| Jordan | 04/03/07 | Tstm Wind | \$ 30,000 |
| Spencer | 06/27/07 | Tstm Wind | \$ - |
| Devore | 10/17/07 | Hail | \$ - |
| 2007 Subtotal | | | \$ 30,000 |
| Spencer | 01/29/08 | Tstm Wind | \$ - |
| Spencer | 06/04/08 | Hail | \$ - |
| Spencer | 06/04/08 | Hail | \$ - |
| Spencer | 06/04/08 | Tstm Wind | \$ 10,000 |
| Southport | 06/04/08 | Tstm Wind | \$ - |
| Southport | 06/04/08 | Tstm Wind | \$ - |
| Carp | 06/04/08 | Tstm Wind | \$ - |
| Carp | 06/04/08 | Tstm Wind | \$ - |
| Freedom | 06/06/08 | Heavy Rain | \$ - |
| Romona | 06/06/08 | Heavy Rain | \$ - |
| Spencer | 06/06/08 | Heavy Rain | \$ - |
| Spencer | 06/06/08 | Heavy Rain | \$ - |
| Patrickburg | 06/27/08 | Tstm Wind | \$ - |
| Gosport | 06/27/08 | Tstm Wind | \$ - |
| Gosport | 06/27/08 | Tstm Wind | \$ - |
| 2008 Subtotal | | | \$ 10,000 |
| Total Property Damage | | | \$ 246,000 |

The historical data is erratic and not wholly documented or confirmed. As a result, potential dollar losses for a future event cannot be precisely calculated; however, based on averages in the last decade, it can be surmised that Owen County incurs an annual risk of approximately \$24,600 per year.

Vulnerability to Future Assets/Infrastructure for Thunderstorm Hazard

All future development within the county and all communities will remain vulnerable to these events.

Analysis of Community Development Trends

Preparing for severe storms will be enhanced if officials sponsor a wide range of programs and initiatives to address the overall safety of county residents. New structures need to be built with more sturdy construction, and those structures already in place need to be hardened to lessen the potential impacts of severe weather. Community warning sirens to provide warning of approaching storms are also vital to preventing the loss of property and ensuring the safety of Owen County residents.

4.4.5 Winter Storm Hazard

Hazard Definition for Winter Storm Hazard

Severe winter weather consists of various forms of precipitation and strong weather conditions. This may include one or more of the following: freezing rain, sleet, heavy snow, blizzards, icy roadways, extreme low temperatures, and strong winds. These conditions can cause human health risks such as frostbite, hypothermia, and death.

Ice (glazing) and Sleet Storms

Ice or sleet, even in the smallest quantities, can result in hazardous driving conditions and can be a significant cause of property damage. Sleet can be easily identified as frozen raindrops. Sleet does not stick to trees and wires. The most damaging winter storms in Indiana have been ice storms. Ice storms are the result of cold rain that freezes on contact with objects having a temperature below freezing. Ice storms occur when moisture-laden gulf air converges with the northern jet stream causing strong winds and heavy precipitation. This precipitation takes the form of freezing rain coating power lines, communication lines, and trees with heavy ice. The winds will then cause the overburdened limbs and cables to snap; leaving large sectors of the population without power, heat, or communication. Falling trees and limbs can also cause building damage during an ice storm. In the past few decades numerous ice storm events have occurred in Indiana.

Snowstorms

Significant snowstorms are characterized by the rapid accumulation of snow, often accompanied by high winds, cold temperatures, and low visibility. A blizzard is categorized as a snowstorm with winds of 35 miles per hour or greater and/or visibility of less than ¼ mile for three or more hours. The strong winds during a blizzard blow falling and already existing snow, create poor visibility and impassable roadways. Blizzards have the potential to result in property damage.

Indiana has repeatedly been struck by blizzards. Blizzard conditions can not only cause power outages and loss of communication, but also make transportation difficult. The blowing of snow can make visibility less than ¼ mile, but the resulting disorientation makes even travel by foot dangerous if not deadly.

Severe Cold

Severe cold is characterized by the ambient air temperature dropping to around 0°F or below. These extreme temperatures can increase the likelihood of frostbite and hypothermia. High winds during severe cold events can enhance the air temperature's affects. Fast winds during cold weather events can lower the wind chill factor (how cold the air feels on your skin). As a result, the time it takes for frostbite and hypothermia to affect a person's body will decrease.

Previous Occurrences for Winter Storm Hazard

The NCDC database identified 21 winter storm and extreme cold events for Owen County since 1950.

For example, on February 12, 2007, a powerful winter storm moved through central Indiana. Extremely heavy snow and blizzard conditions crippled much of the northern half of central Indiana for as much as several days, while southern portions of the area were affected by freezing rain.

The largest snow event of the season struck central Indiana on February 12 through 14. The snow began during the evening of February 12, moving from the southwest to northeast across central Indiana. The snow continued in Indianapolis for nearly 30 hours, and when it was done in the early morning hours of February 14, Indianapolis had received 8.5 inches of snow.

The NCDC winter storms are listed in Table 4-34. Additional details for NCDC events are included in Appendix D.

Table 4-34: Winter Storm Events*

| Location or County | Date | Type | Magnitude | Deaths | Injuries | Property Damage | Crop Damage |
|--------------------|------------|-----------------|-----------|--------|----------|-----------------|-------------|
| Owen | 10/29/1993 | Snow | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/14/1994 | Extreme Cold | N/A | 3 | 0 | 5.0M | 0 |
| Owen | 2/8/1994 | Sleet/ice Storm | N/A | 0 | 0 | 500K | 0 |
| Owen | 12/8/1995 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 12/18/1995 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/2/1996 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/6/1996 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 2/2/1996 | Extreme Cold | N/A | 0 | 0 | 0 | 0 |
| Owen | 3/19/1996 | Heavy Snow | N/A | 0 | 0 | 0 | 0 |
| Owen | 12/16/1996 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/15/1997 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/24/1997 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 11/13/1997 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 1/1/1999 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 3/8/1999 | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| Owen | 3/11/2000 | Heavy Snow | N/A | 0 | 0 | 0 | 0 |
| Owen | 12/24/2002 | Heavy Snow | N/A | 0 | 0 | 0 | 0 |
| Owen | 12/22/2004 | Heavy Snow | N/A | 0 | 3 | 3.0M | 0 |
| Owen | 12/8/2005 | Heavy Snow | N/A | 0 | 0 | 0 | 0 |
| Owen | 3/21/2006 | Heavy Snow | N/A | 0 | 0 | 0 | 0 |
| Owen | 2/12/2007 | Winter Storm | N/A | 0 | 0 | 0K | 0K |

* NCDC records are estimates of damage compiled by the National Weather Service from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to a given weather event.

Geographic Location for Winter Storm Hazard

Severe winter storms are regional in nature. Most of the NCDC data is calculated regionally or in some cases statewide.

Hazard Extent for Winter Storm Hazard

The extent of the historical winter storms varies in terms of storm location, temperature, and ice or snowfall. A severe winter storm can occur anywhere in the jurisdiction.

Calculated Priority Risk Index for Winter Storm Hazard

Based on historical information, the probability of future winter storms is highly likely. Winter storms of varying magnitudes are expected to happen. According to the CPRI, winter storms ranked as the number four hazard.

CPRI = Probability X .45 + Magnitude/Severity X .30 + Warning Time X .15 + Duration of event X .10.

| Probability | + | Magnitude /Severity | + | Warning Time | + | Duration | = | CPRI |
|-------------|---|---------------------|---|--------------|---|----------|---|------|
| 4 x .45 | + | 1 x .30 | + | 3 x .15 | + | 3 x .10 | = | 2.85 |

Vulnerability Analysis for Winter Storm Hazard

Winter storm impacts are equally distributed across the entire jurisdiction; therefore, the entire county is vulnerable to a winter storm and can expect the same impacts within the affected area. The building exposure for Owen County, as determined from the building inventory, is included in Table 4-9.

Critical Facilities

All critical facilities are vulnerable to a winter storm. A critical facility will encounter many of the same impacts as other buildings within the jurisdiction. These impacts include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, broken water pipes, and roof collapse from heavy snow. Table 4-8 lists the types and numbers of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-9. The impacts to the general buildings within the county are similar to the damages expected to the critical facilities. These include loss of gas or electricity from broken or damaged utility lines, damaged or impassable roads and railways, broken water pipes, and roof collapse from heavy snow.

Infrastructure

During a winter storm the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since the county's entire infrastructure is equally vulnerable it is important to emphasize that any number of these items could become damaged during a winter storm. Potential impacts include broken gas and/or electricity lines or damaged utility lines, damaged or impassable roads and railways, and broken water pipes.

Potential Dollar Losses for Winter Storm Hazard

A HAZUS-MH analysis was not completed for winter storms because the widespread extent of such a hazard makes it difficult to accurately model outcomes.

To determine dollar losses for a winter storm hazard, the available NCDC hazard information was condensed to include only winter storm hazards that occurred within the past ten years. Owen County's MHMP team then reviewed the property damages reported to NCDC and made any applicable updates.

It was determined that since 1998, Owen County has incurred \$3 million in damages relating to winter storms, including ice and heavy snowfall. The resulting information is listed in Table 4-35.

Table 4-35: Owen County Property Damage (1998–2008)

| Location or County | Date | Type | Property Damage |
|------------------------------|----------|--------------|---------------------|
| Owen | 01/01/99 | Winter Storm | \$ - |
| Owen | 03/08/99 | Winter Storm | \$ - |
| 1999 Subtotal | | | \$ - |
| Owen | 03/11/00 | Heavy Snow | \$ - |
| 2000 Subtotal | | | \$ - |
| Owen | 12/24/02 | Heavy Snow | \$ - |
| 2002 Subtotal | | | \$ - |
| Owen | 12/22/04 | Heavy Snow | \$ 3,000,000 |
| 2004 Subtotal | | | \$ 3,000,000 |
| Owen | 03/21/06 | Heavy Snow | \$ - |
| 2006 Subtotal | | | \$ - |
| Owen | 02/12/07 | Winter Storm | \$ - |
| 2007 Subtotal | | | \$ - |
| Total Property Damage | | | \$ 3,000,000 |

The historical data is erratic and not wholly documented or confirmed. As a result, potential dollar losses for a future event cannot be precisely calculated; however, based on averages in the last decade, it can be surmised that Owen County incurs an annual risk of approximately \$300,000 per year.

Vulnerability to Future Assets/Infrastructure for Winter Storm Hazard

Any new development within the county will remain vulnerable to these events.

Analysis of Community Development Trends

Because the winter storm events are regional in nature future development will be equally impacted across the county.

4.4.6 Hazardous Materials Storage and Transport Hazard

Hazard Definition for Hazardous Materials Storage and Transport Hazard

The State of Indiana has numerous active transportation lines that run through many of the counties in the state. Active railways transport harmful and volatile substances between our borders every day. The transportation of chemicals and substances along interstate routes is commonplace in Indiana. The rural areas of Indiana have considerable agricultural commerce creating a demand for fertilizers, herbicides, and pesticides to be transported along rural roads. Finally, Indiana is bordered by two major rivers and Lake Michigan. Barges transport chemicals and substances along these waterways daily. These factors increase the chance of hazardous material releases and spills throughout the State of Indiana.

The release or spill of certain substances can cause an explosion. Explosions result from the ignition of volatile products such as petroleum products, natural and other flammable gases, hazardous materials/chemicals, dust, and bombs. An explosion can potentially cause death, injury, and property damage. In addition, a fire routinely follows an explosion which may cause further damage and inhibit emergency response. Emergency response may require fire, safety/law enforcement, search and rescue, and hazardous materials units.

Previous Occurrences for Hazardous Materials Storage and Transport Hazard

Owen County has not experienced a significantly large-scale hazardous material incident at a fixed site or during transport resulting in multiple deaths or serious injuries, although there have been many minor releases that have put local firefighters, hazardous materials teams, emergency management, and local law enforcement into action to try to stabilize these incidents and prevent or lessen harm to Owen County residents.

Geographic Location for Hazardous Materials Storage and Transport Hazard

The hazardous material hazards are countywide and are primarily associated with the transport of materials via highway, railroad, and/or river barge.

Hazard Extent for Hazardous Materials Storage and Transport Hazard

The extent of the hazardous material hazard varies both in terms of the quantity of material being transported as well as the specific content of the container.

Calculated Priority Risk Index for Hazardous Materials Storage and Transport Hazard

There is the possibility of a major hazardous material event based on historical information and input from Owen County EMA. According to the CPRI, Hazardous Materials Storage and Transport ranked as the number four hazard in the county along with earthquakes.

CPRI = Probability X .45 + Magnitude/Severity X .30 + Warning Time X .15 + Duration of event X .10.

| | | | | | | | | |
|--------------------|----------|----------------------------|----------|---------------------|----------|-----------------|----------|-------------|
| Probability | + | Magnitude /Severity | + | Warning Time | + | Duration | = | CPRI |
| 2 x .45 | + | 2 x .30 | + | 4 x .15 | + | 2 x .10 | = | 2.3 |

Vulnerability Analysis for Hazardous Materials Storage and Transport Hazard

Hazardous material impacts are an equally distributed threat across the entire jurisdiction; therefore, the entire county is vulnerable to a hazardous material release and can expect the same impacts within the affected area. The main concern during a release or spill is the populations affected. The building exposure for Owen County, as determined from building inventory, is included in Table 4-9. This plan will therefore consider all buildings located within the county as vulnerable.

Critical Facilities

All critical facilities and communities within the county are at risk. A critical facility will encounter many of the same impacts as any other building within the jurisdiction. These impacts include structural failure due to fire or explosion and loss of function of the facility (e.g. a damaged police station will no longer be able to serve the community). Table 4-8 lists the types and numbers of all essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-9. The buildings within the county can all expect the same impacts, similar to those discussed for critical facilities. These impacts include structural failure due to fire or explosion or debris and loss of function of the building (e.g. a damaged home will no longer be habitable causing residents to seek shelter).

Infrastructure

During a hazardous material release the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. Since an extensive inventory of the infrastructure is not available to this plan it is important to emphasize that any number of these items could become damaged in the event of a hazardous material release. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); and railway failure from broken or impassable railways. Bridges could fail or become impassable causing risk to traffic.

In terms of numbers and types of buildings and infrastructure, typical scenarios are described to gauge the anticipated impacts of hazardous material release events in the county.

The U.S. EPA's ALOHA (Areal Locations of Hazardous Atmospheres) model was utilized to assess the area of impact for an anhydrous ammonia release on State Hwy 46 on the west side of Spencer in front of the Wal-Mart store.

Anhydrous ammonia is a clear colorless gas with a strong odor. Contact with the unconfined liquid can cause frostbite. Though the gas is generally regarded as nonflammable, it can burn within certain vapor concentration limits with strong ignition. The fire hazard increases in the presence of oil or other combustible materials. Vapors from an anhydrous ammonia leak initially hug the ground, and prolonged exposure of containers to fire or heat may cause violent rupturing and rocketing. Long-term inhalation of low concentrations of the vapors or short-term inhalation of high concentrations has adverse health effects. Anhydrous ammonia is generally used as a fertilizer, a refrigerant, and in the manufacture of other chemicals.

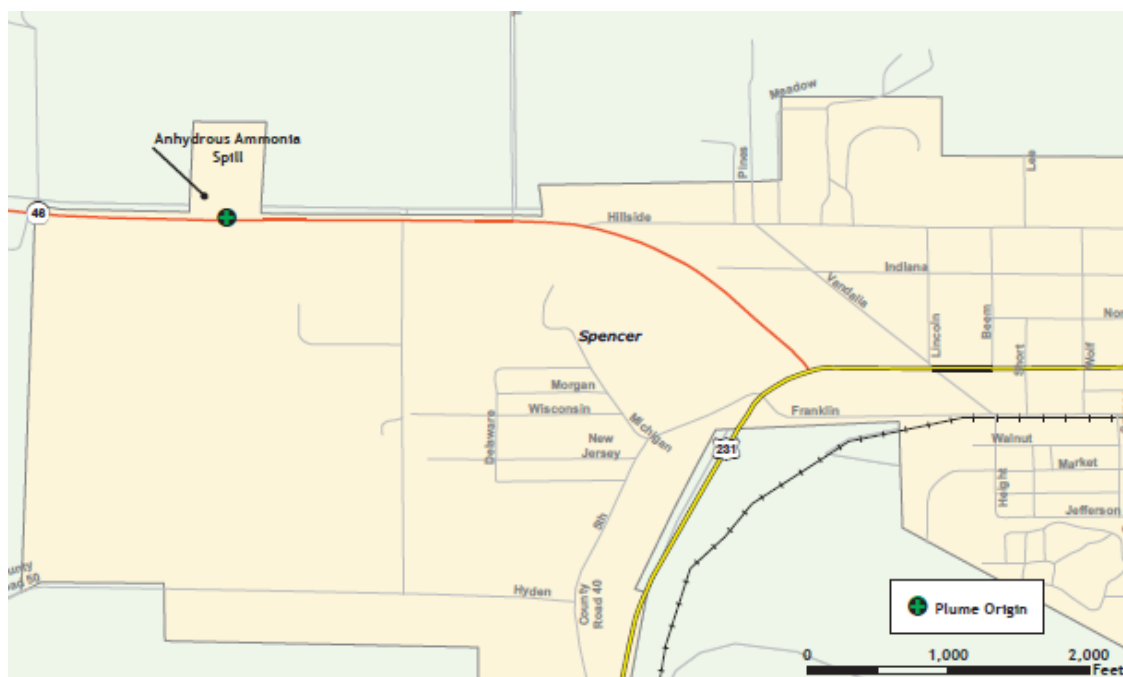
Source: CAMEO

ALOHA is a computer program designed especially for use by people responding to chemical accidents, as well as for emergency planning and training. Anhydrous ammonia is a common chemical used in industrial operations and can be found in either liquid or gas form. Rail and truck tankers commonly haul anhydrous ammonia to and from facilities.

For this scenario, moderate atmospheric and climatic conditions with a slight breeze from the west were assumed. The target area was chosen due to its proximity to residential and commercial interests in the area and the high level of daily vehicular traffic.

The geographic area covered in this analysis is depicted in Figure 4-12.

Figure 4-12: Location of Chemical Release



Analysis

The ALOHA atmospheric modeling parameters, depicted in Figure 4-13, were based on a westerly wind speed of five mph. The temperature was 68°F with 75% humidity and partly cloudy skies.

The source of the chemical spill is a horizontal, cylindrical-shaped tank truck. The diameter of the tank was set to 6.39 feet and the length set to 48 feet (11,500 gallons). At the time of its release, it was estimated that the tank was 85% full. The anhydrous ammonia in this tank is in its liquid state.

This release was based on a leak from a 2.5 inch-diameter hole, 12 inches above the bottom of the tank.

Figure 4-13: ALOHA Plume Modeling Parameters

SITE DATA:

Location: SPENCER, INDIANA
Building Air Exchanges Per Hour: 0.29 (sheltered single storied)
Time: February 23, 2009 1057 hours EST (using computer's clock)

CHEMICAL DATA:

Chemical Name: AMMONIA Molecular Weight: 17.03 g/mol
ERPG-1: 25 ppm ERPG-2: 150 ppm ERPG-3: 750 ppm
IDLH: 300 ppm LEL: 160000 ppm UEL: 250000 ppm
Ambient Boiling Point: -28.9° F
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

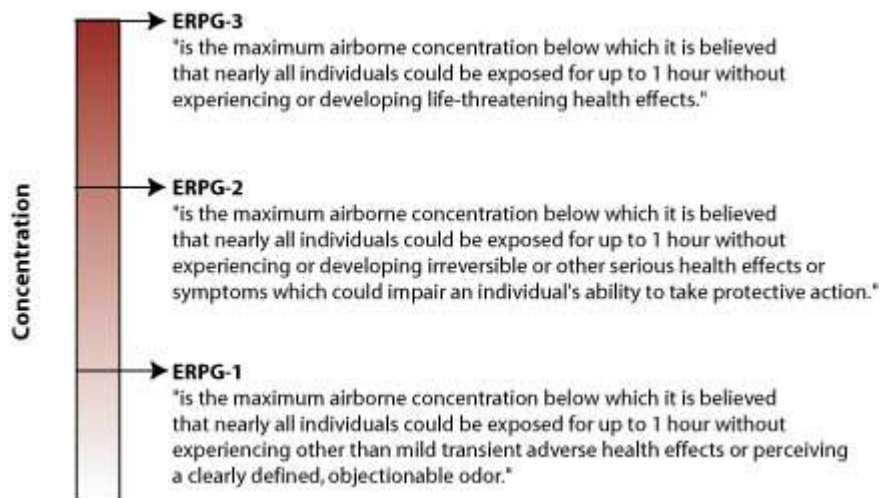
Wind: 5 miles/hour from W at 10 meters
Ground Roughness: open country Cloud Cover: 5 tenths
Air Temperature: 68° F Stability Class: C
No Inversion Height Relative Humidity: 75%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank
Flammable chemical escaping from tank (not burning)
Tank Diameter: 6.39 feet Tank Length: 48 feet
Tank Volume: 11500 gallons
Tank contains liquid Internal Temperature: 68° F
Chemical Mass in Tank: 24.9 tons Tank is 85% full
Circular Opening Diameter: 2.5 inches
Opening is 12 inches from tank bottom
Release Duration: 14 minutes
Max Average Sustained Release Rate: 7,730 pounds/min
(averaged over a minute or more)
Total Amount Released: 45,484 pounds
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

The Emergency Response Planning Guidelines (ERPGs) were developed by the ERPG committee of the American Industrial Hygiene Association. The ERPGs were developed as planning guidelines, to anticipate human adverse health effects caused by exposure to toxic chemicals. The ERPGs are three-tiered guidelines with one common denominator—a one-hour contact duration. Each guideline identifies the substance, its chemical and structural properties, animal toxicology data, human experience, existing exposure guidelines, the rationale behind the selected value, and a list of references. Figure 4-14 illustrates the ERPG three-tiered guidelines.

Figure 4-14: Three-Tiered ERPG Public Exposure Guidelines



The definitions and format are from the ERPG publication.

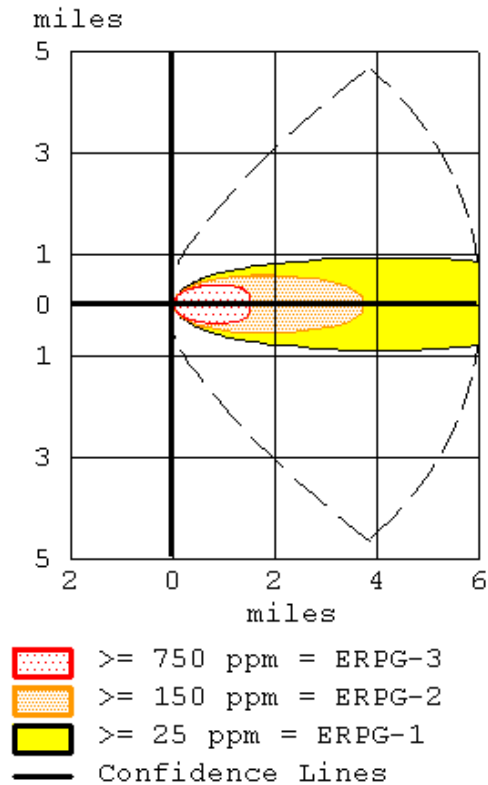
The ERPG guidelines do not protect everyone. Hypersensitive individuals would suffer adverse reactions to concentrations far below those suggested in the guidelines. In addition, ERPGs, like other exposure guidelines, are based mostly on animal studies, thus raising the question of applicability to humans. The guidelines are focused on one period of time—one hour. Exposure in the field may be longer or shorter. However, the ERPG committee strongly advises against trying to extrapolate ERPG values to longer periods of time.

The most important point to remember about the ERPGs is that they do not contain safety factors usually incorporated into exposure guidelines such as the TLV. Rather, they estimate how the general public would react to chemical exposure. Just below the ERPG-1, for example, most people would detect the chemical and may experience temporary, mild effects. Just below the ERPG-3, on the other hand, it is estimated that the effects would be severe, although not life-threatening. The TLV differs in that it incorporates a safety factor into its guidelines, to prevent ill effects. The ERPG should serve as a planning tool, not a standard to protect the public.

Source: <http://archive.orr.noaa.gov/comeo/locs/expguide.html>

According to the ALOHA parameters, approximately 7,730 pounds of material would be released per minute. The images in Figures 4-15 and 4-16 depict the plume footprint generated by ALOHA.

Figure 4-15: Plume Footprint Generated by ALOHA

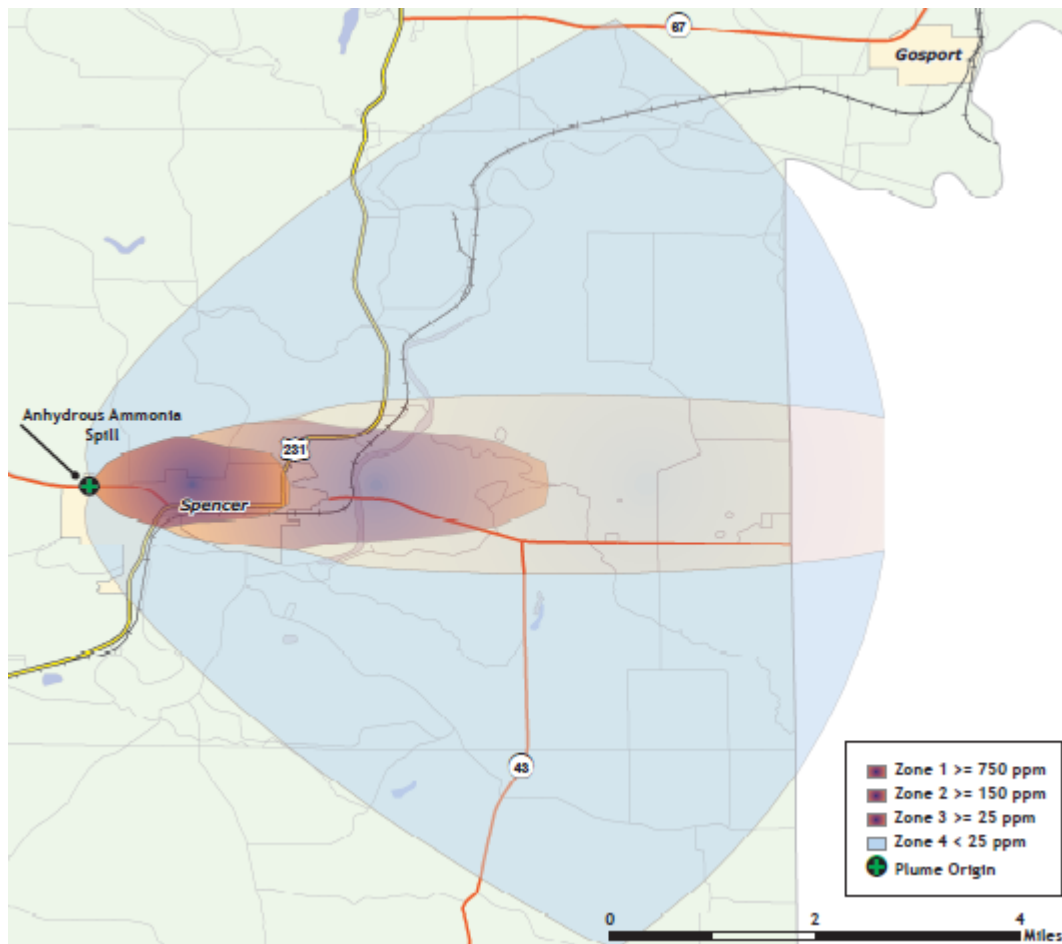


As the substance moves away from the source, the level of substance concentration decreases. Each color-coded area depicts a level of concentration measured in parts per million (ppm). For the purpose of clarification, this report will designate each level of concentration as a specific zone. The zones are as follows:

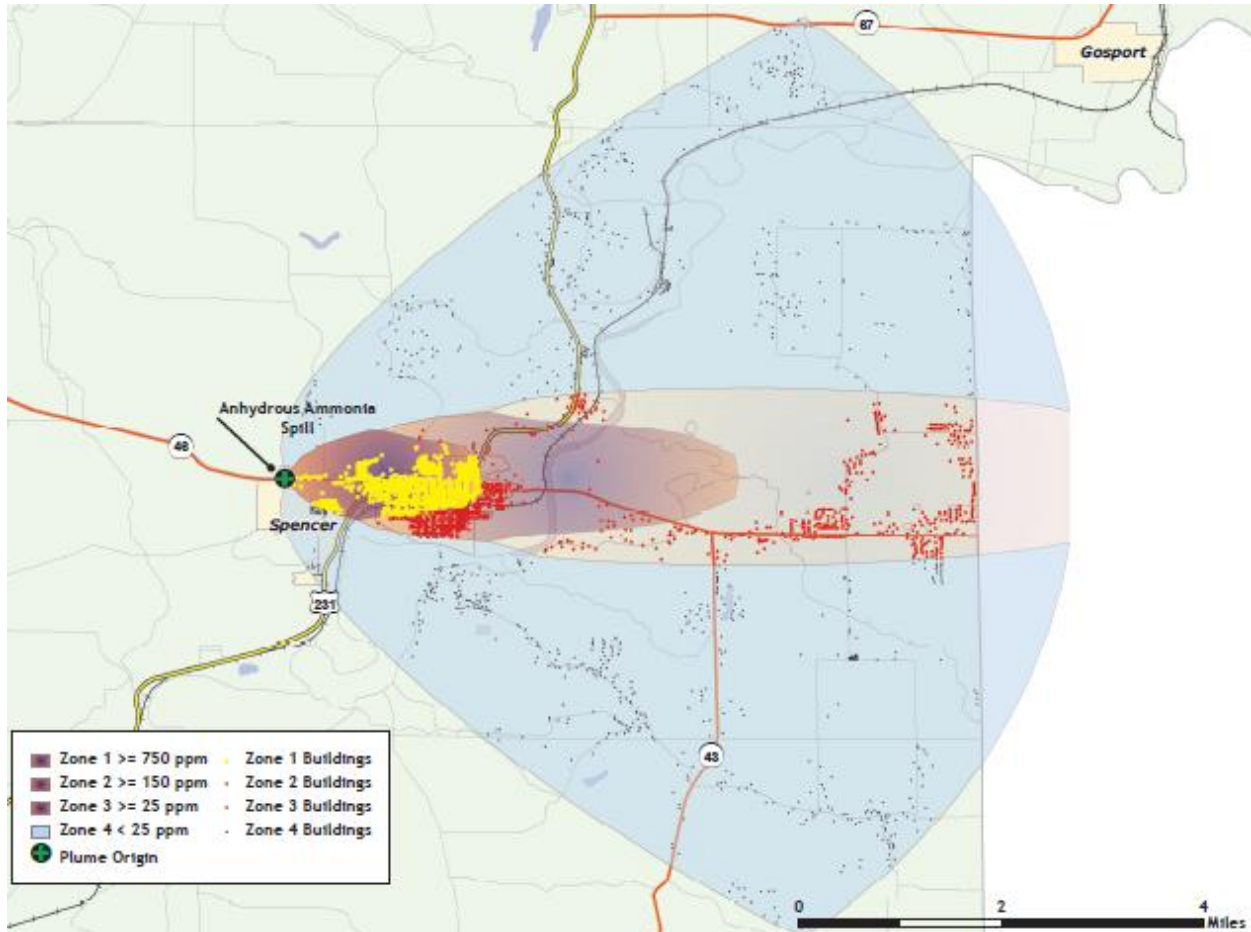
- **Zone 1 (ERPG-3):** The red buffer (≥ 750 ppm) extends no more than 1.5 miles from the point of release after one hour.
- **Zone 2 (ERPG-2):** The orange buffer (≥ 150 ppm) extends no more than 3.7 miles from the point of release after one hour.
- **Zone 3 (ERPG-1):** The yellow buffer (≥ 25 ppm) extends more than six miles from the point of release after one hour.
- **Zone 4 (Confidence Lines):** The dashed lines depict the level of confidence in which the exposure zones will be contained. The ALOHA model is 95% confident that the release will stay within this boundary.

The image in Figure 4-16 depicts the plume footprint generated by ALOHA.

Figure 4-16: ALOHA Plume Footprint Overlaid in ArcGIS



The Owen County Building Inventory was added to ArcMap and overlaid with the plume footprint. The Building Inventory was then intersected with each of the four footprint areas to classify each point based on the plume footprint in which it is located. Figure 4-17 depicts the Owen County Building Inventory after the intersect process.

Figure 4-17: Owen County Building Inventory Classified By Plume Footprint

Results

By summing the building inventory within all ERPG zones (Zone 1: ≥ 750 ppm, Zone 2: ≥ 150 ppm, Zone 3: ≥ 25 ppm, and Zone 4: < 25 ppm), the GIS overlay analysis predicts that as many as 2,685 buildings could be exposed at a replacement cost of \$316.9 million. If this event were to occur, approximately 5,080 people would be affected.

Building Inventory Damage

The results of the analysis against the Building Inventory points are depicted in Tables 4-36 through 4-40. Table 4-36 summarizes the results of the chemical spill by combining all ERPG zones.

Table 4-36: Estimated Exposure for all Zones (all ppm)

| Occupancy | Population | Building Counts | Building Exposure (thousands) |
|------------------|-------------------|------------------------|--------------------------------------|
| Residential | 5,080 | 2,032 | \$184,270 |
| Commercial | 0 | 195 | \$39,610 |
| Industrial | 0 | 27 | \$16,577 |
| Agriculture | 0 | 335 | \$30,576 |
| Religious | 0 | 70 | \$30,698 |
| Government | 0 | 22 | \$10,346 |
| Education | 0 | 4 | \$4,769 |
| Total | 5,080 | 2,685 | \$316,846 |

Tables 4-37 through 4-39 summarize the results of the chemical spill for each zone separately.

Table 4-37: Estimated Exposure for Zone 1 >= 750 ppm)

| Occupancy | Population | Building Counts | Building Exposure (thousands) |
|------------------|-------------------|------------------------|--------------------------------------|
| Residential | 1,650 | 660 | \$66,461 |
| Commercial | 0 | 123 | \$26,832 |
| Industrial | 0 | 5 | \$5,723 |
| Agriculture | 0 | 3 | \$316 |
| Religious | 0 | 32 | \$19,493 |
| Government | 0 | 12 | \$8,147 |
| Education | 0 | 2 | \$0 |
| Total | 1,650 | 837 | \$126,971 |

Table 4-38: Estimated Exposure for Zone 2 >= 150 ppm)

| Occupancy | Population | Building Counts | Building Exposure (thousands) |
|------------------|-------------------|------------------------|--------------------------------------|
| Residential | 1,075 | 430 | \$40,031 |
| Commercial | 0 | 29 | \$5,909 |
| Industrial | 0 | 7 | \$8,799 |
| Agriculture | 0 | 12 | \$1,547 |
| Religious | 0 | 17 | \$3,470 |
| Government | 0 | 6 | \$2,131 |
| Education | 0 | 0 | \$0 |
| Total | 1,075 | 501 | \$61,887 |

Table 4-39: Estimated Exposure for Zone 3 >= 25 ppm)

| Occupancy | Population | Building Counts | Building Exposure (thousands) |
|------------------|-------------------|------------------------|--------------------------------------|
| Residential | 825 | 330 | \$38,097 |
| Commercial | 0 | 19 | \$3,168 |
| Industrial | 0 | 2 | \$160 |
| Agriculture | 0 | 45 | \$3,497 |
| Religious | 0 | 12 | \$5,293 |
| Government | 0 | 2 | \$0 |
| Education | 0 | 0 | \$0 |
| Total | 825 | 410 | \$50,215 |

Zone 4 depicts the level of confidence in which the exposure zones will be contained. The ALOHA model is 95% confident that the release will stay within this boundary. Table 4-40 summarizes the results of the chemical spill for Zone 4.

Table 4-40: Estimated Exposure for Zone 4 < 25 ppm)

| Occupancy | Population | Building Counts | Building Exposure (thousands) |
|------------------|-------------------|------------------------|--------------------------------------|
| Residential | 1,530 | 612 | \$39,681 |
| Commercial | 0 | 24 | \$3,700 |
| Industrial | 0 | 13 | \$1,896 |
| Agriculture | 0 | 275 | \$25,217 |
| Religious | 0 | 9 | \$2,442 |
| Government | 0 | 2 | \$67 |
| Education | 0 | 2 | \$4,769 |
| Total | 1,530 | 937 | \$77,773 |

Essential Facilities Damage

There are 13 essential facilities within the limits of the chemical spill plume. The affected facilities are identified in Table 4-41. Their geographic locations are depicted in Figures 4-18 and 4-19.

Table 4-41: Essential Facilities within Plume Footprint

| Name |
|---|
| The Residence at McCormick's Creek |
| Hometown Health Care |
| Owen County WIC |
| Owen Valley Fire Department Emergency Operations Center |
| Spencer Emergency Operations Center |
| Owen Valley Fire Department |
| Spencer Police Department |

| Name |
|-------------------------------------|
| Owen County Sheriff Department |
| Spencer Adventist Christian School |
| McCormick's Creek Elementary School |
| Owen Valley Community High School |
| Owen Valley Middle School |
| Spencer Elementary School |

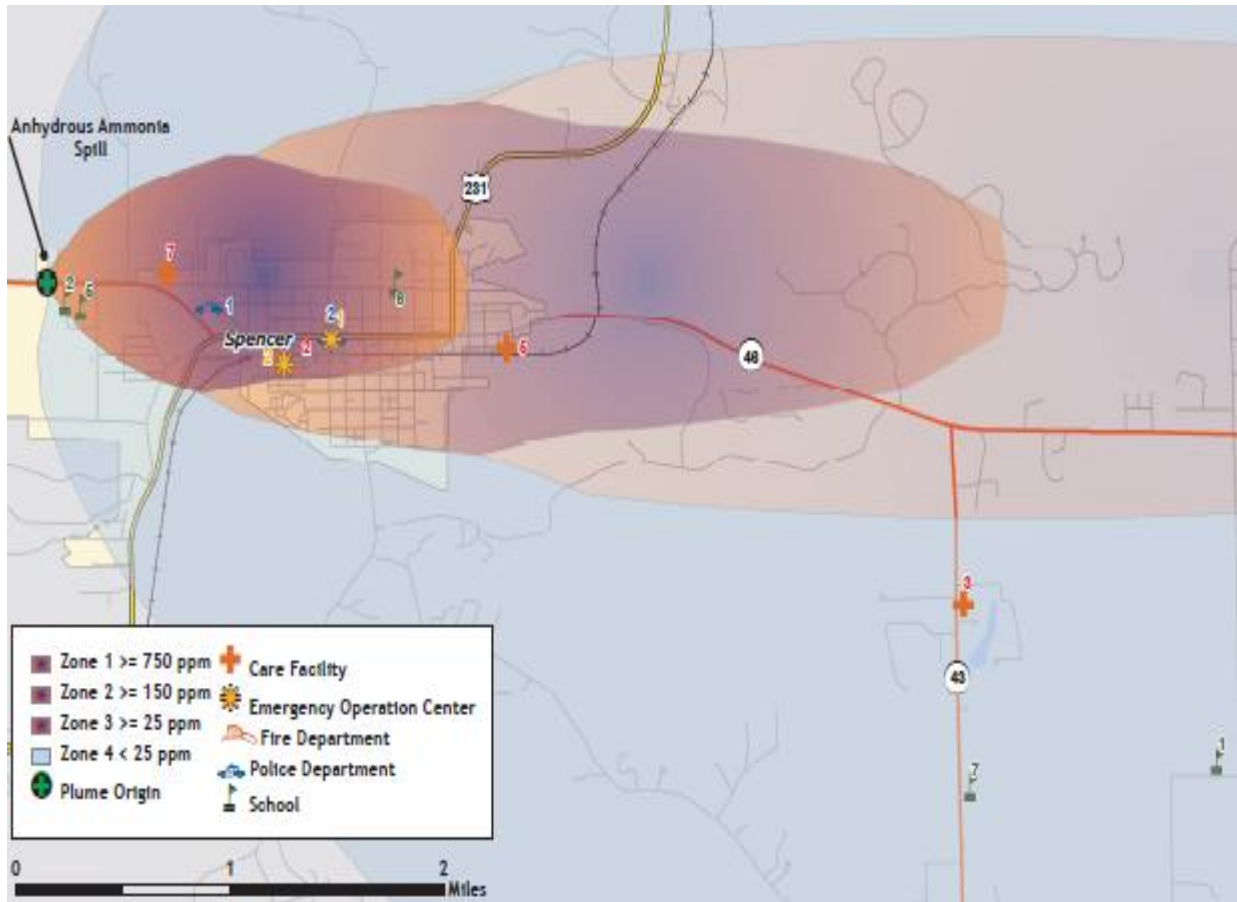
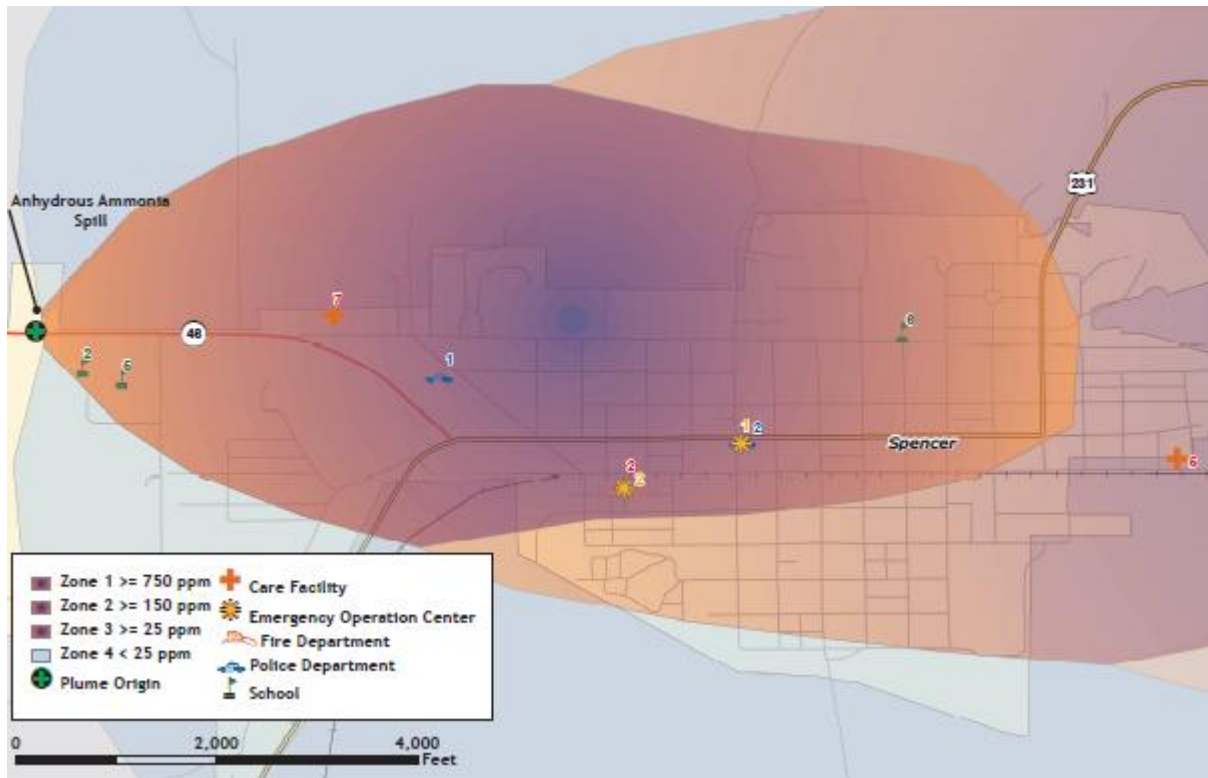
Figure 4-18: Essential Facilities within Plume Footprint

Figure 4-19: Essential Facilities at Greatest Risk

Vulnerability to Future Assets/Infrastructure for Hazardous Materials Storage and Transport Hazard

Any new development within the county will be vulnerable to these events, especially development along major roadways.

Analysis of Community Development Trends

Because the hazardous material hazard events may occur anywhere within the county, future development will be impacted. The major transportation routes and the industries located in Owen County pose a threat of dangerous chemicals and hazardous materials release.

4.4.7 Ground Failure Hazard

Hazard Definition for Ground Failure

For ground failure this plan will only address land subsidence and landslides.

Land subsidence

Southern Indiana has a network of underground caves formed by what is known as karst landscape. According to the IGS, karst landscapes usually occur where carbonate rocks (limestone and dolostone) underlie the surface. Freely circulating slightly acidic water in the soil slowly dissolves the bedrock causing karst formations. These karst formations have the potential to collapse under the weight of the ground above them creating a sinkhole. Ground failure of this nature is known as land subsidence. Any structures built above a karst formation could potentially be subject to land subsidence and collapse into a resulting sinkhole.

Indiana additionally has networks of coal mines scattered throughout the southern portion of the state. These coal mines can fail and create ground failures damaging anything on the overlying surfaces.

Landslides

The USGS claims that landslides are a significant geologic hazard in the United States causing \$1–2 billion in damage and more than 25 fatalities per year. The expansion of urban and recreational development into hillside areas has resulted in an increasing number of properties subject to damage as a result of landslides. Landslides commonly occur in connection with other major natural disasters such as earthquakes, wildfires, and floods.

Previous Occurrences for Ground Failure

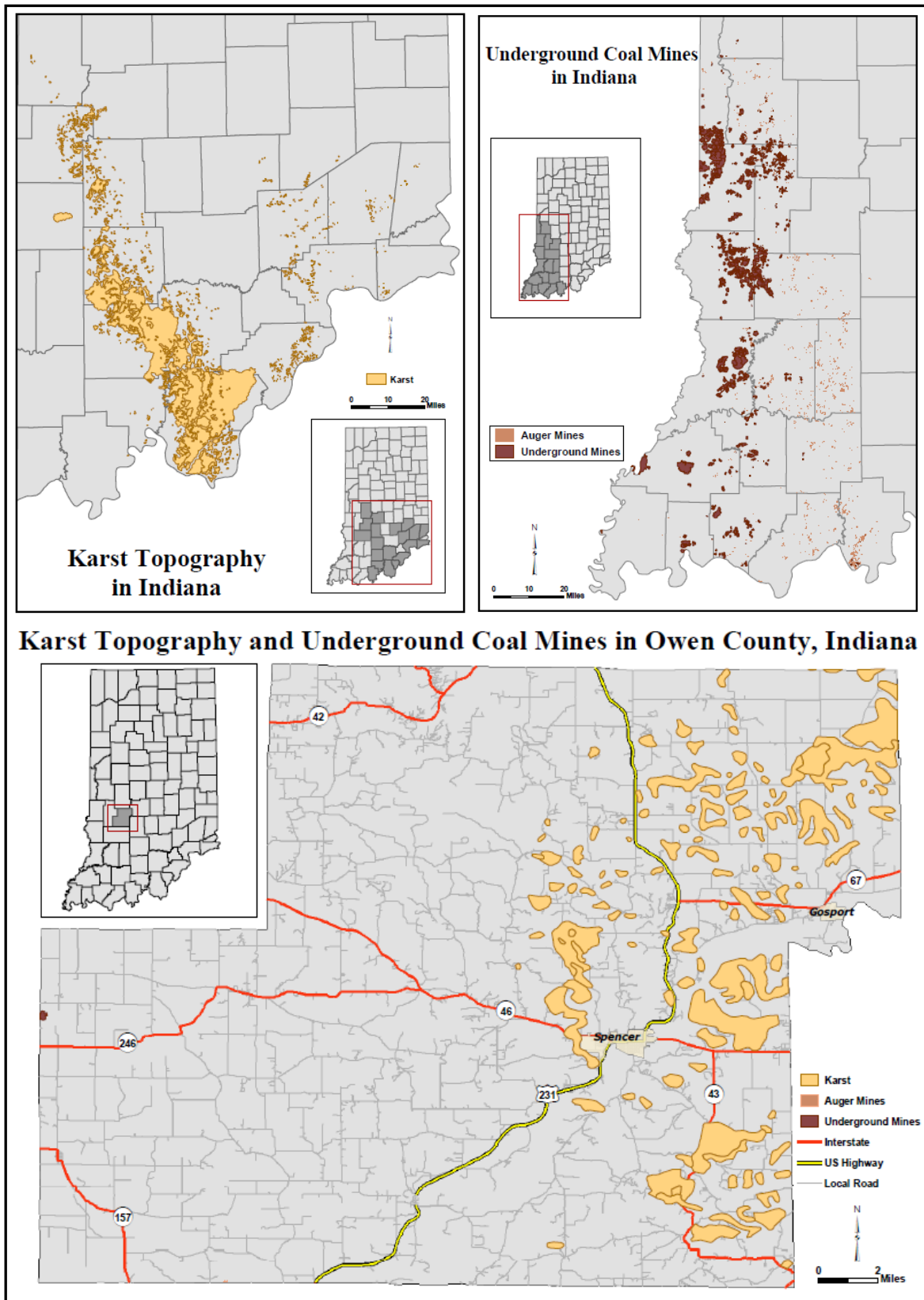
A list of previous ground failure events could not be obtained. Unrecorded landslide and land subsidence events occur throughout Owen County with varying degrees of severity.

Geographic Location for Ground Failure

The Mitchell Plateau is a broad limestone karst plateau in Indiana dissected by a few major stream systems. This plateau developed on Mississippian limestone and extends from the eastern part of Owen County southward to the Ohio River in Harrison County.

Owen County is also dotted with a number of underground mines, which cause ground failure. Figure 4-20 illustrates the statewide and countywide ground failure potential: Figure 4-20A depicts the state's karst topography; Figure 4-20B depicts the state's underground coal mines; and Figure 4-20C shows the countywide locations of underground coal mines.

Figure 4-20A, B, and C: Ground Failure Map



Hazard Extent for Land Ground Failure

The extent of the ground failure hazard is closely related to development near the regions that are at risk. The extent will vary within these areas depending on the potential of elevation change, as well as the size of the underground structure. The hazard extent of ground failure is spread throughout the entire county in various concentrated areas.

Calculated Priority Risk Index for Ground Failure

Based on local knowledge of the susceptible areas in Owen County, the probability of failure is unlikely. Ground failure ranked as the number seven hazard in Owen County.

CPRI = Probability X .45 + Magnitude/Severity X .30 + Warning Time X .15 + Duration of event X .10.

| Probability | + | Magnitude /Severity | + | Warning Time | + | Duration | = | CPRI |
|-------------|---|---------------------|---|--------------|---|----------|---|------|
| 1 x .45 | + | 2 x .30 | + | 4 x .15 | + | 2 x .10 | = | 1.85 |

Vulnerability Analysis for Ground Failure

Because of the difficulty predicting which communities are at risk of ground failure, the entire population and all buildings have been identified as at risk. As a result this plan will consider all buildings as vulnerable. The existing buildings and infrastructure of Owen County are discussed in Table 4-9.

Critical Facilities

Any critical facility built above a karst landscape could be vulnerable to land subsidence. A critical facility will encounter many of the same impacts as any other building within the affected area. These impacts include damages ranging from cosmetic to structural. Buildings may sustain minor cracks in walls due to a small amount of settling, while in more severe cases the failure of building foundations causes cracking of critical structural elements. Table 4-8 lists the types and numbers of all of the essential facilities in the area. Critical facility information, including replacement costs, is included in Appendix F. A map of the critical facilities is included in Appendix G.

Building Inventory

A table of the building exposure in terms of types and numbers of buildings for the entire county is listed in Table 4-9. The buildings within this area can all anticipate the same impacts, similar to those discussed for critical facilities. These impacts include damages ranging from cosmetic to structural. Buildings may sustain minor cracks in walls due to a small amount of settling, while in more severe cases the failure of building foundations causes cracking of critical structural elements.

Infrastructure

In the area of Owen County affected by land subsidence, the types of infrastructure that could be impacted include roadways, utility lines/pipes, railroads, and bridges. The risk to these structures is primarily associated with land collapsing directly beneath them in a way that undermines their structural integrity. Since all infrastructure in the affected area is equally vulnerable it is important to emphasize that any number of these items could become damaged as a result of significant land subsidence. The impacts to these items include broken, failed, or impassable roadways; broken or failed utility lines (e.g. loss of power or gas to community); and railway failure from broken or impassable railways. In addition bridges could fail or become impassable causing risk to traffic.

Vulnerability to Future Assets/Infrastructure for Ground Failure

All future communities, buildings, and infrastructure will remain vulnerable to ground failure in the areas of Owen County where karst features exist and in areas of significant elevation change. In areas with higher levels of population the vulnerability is greater than in open areas with no infrastructure demands.

Analysis of Community Development Trends

Abandoned underground mine subsidence may affect several locations within the county; therefore buildings and infrastructure are vulnerable to subsidence. Continued development will occur in many of these areas. Currently, Owen County reviews new development for compliance with local zoning ordinances. Newly planned construction should be reviewed with the historical mining maps to minimize potential subsidence structural damage.

Section 5 - Mitigation Strategy

The goal of mitigation is to reduce the future impacts of a hazard including property damage, disruption to local and regional economies, and the amount of public and private funds spent to assist with recovery. The goal of mitigation is to build disaster-resistant communities. Mitigation actions and projects should be based on a well-constructed risk assessment, which is provided in Section 4 of this plan. Mitigation should be an ongoing process adapting over time to accommodate a community's needs.

5.1 Community Capability Assessment

The capability assessment identifies current activities used to mitigate hazards. The capability assessment identifies the policies, regulations, procedures, programs, and projects that contribute to the lessening of disaster damages. The assessment also provides an evaluation of these capabilities to determine whether the activities can be improved in order to more effectively reduce the impact of future hazards. The following sections identify existing plans and mitigation capabilities within all of the communities listed in Section 2 of this plan.

5.1.1 National Flood Insurance Program (NFIP)

The county and the Town of Spencer are members of the NFIP. The Town of Gosport has no identified flood boundaries and opts not to participate in the program. HAZUS-MH identified approximately 297 households located within the Owen County Special Flood Hazard Area; 88 households paid flood insurance, insuring \$7,953,100 in property value. The total premiums collected amounted to \$46,896, which on average was \$532.91 annually. As of November 30, 2006, 62 claims were filed totaling \$847,076.01. The average claim was \$13,662.52.

The county and incorporated areas do not participate in the NFIP'S Community Rating System (CRS). The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: 1) reduce flood losses; 2) facilitate accurate insurance rating; and 3) promote the awareness of flood insurance.

Table 5-1 identifies each community and the date each participant joined the NFIP.

Table 5-1: Additional Information on Communities Participating in the NFIP

| Community | Participation Date | FIRM Date | CRS Date | CRS Rating | Flood Plain Zoning Ordinance Adopted Last |
|-----------------|--------------------|-----------|----------|------------|---|
| Owen County | 05/15/81 | 04/01/93 | N/A | N/A | N/A |
| Town of Spencer | 12/17/73 | 09/01/89 | N/A | N/A | 6/18/08 |

5.1.2 Stormwater Management Stream Maintenance Ordinance

Neither Owen County nor its incorporated jurisdictions have stormwater management ordinances.

5.1.3 Zoning Management Ordinance

Owen County has a Zoning and Subdivision Control Ordinance, established in 2003. The Town of Spencer also has Zoning Ordinance, Title XV, Chapter 152 that covers the corporate boundaries of the town.

The following table identifies the date of adoption of the Comprehensive Plans, Zoning Ordinances, Subdivision Control Ordinance. The County and the Town of Spencer each have zoning administrators.

Table 5-2: Description of Zoning Plans/Ordinances

| Community | Comp Plan | Zoning Ord | Subd Control Ord | Erosion Control | Storm Water Mgmt | Burning Ord | Seismic Ord | Bldg. Stndrds |
|-------------|-----------|------------|------------------|-----------------|------------------|-------------|-------------|---------------|
| Owen County | 2004 | 05/26/03 | 05/26/03 | N/A | N/A | N/A | N/A | 11/08/02 |
| Spencer | 2004 | 06/16/08 | 06/16/08 | N/A | N/A | 06/16/08 | N/A | 06/16/08 |
| Gosport | N/A | 06/16/08 | N/A | N/A | N/A | N/A | N/A | N/A |

5.1.4 Erosion Management Program/ Policy

Owen County utilizes Rule 5, administered by the Indiana Department of Environmental Management, with assistance of the Indiana Department of Natural Resources and the Soil and Water Conservation. This requires the submission of an erosion control plan for projects involving more than five acres of land disturbance. Erosion management is identified within the Subdivision Control Ordinances of Owen County and the Town of Spencer.

5.1.5 Fire Insurance Rating Programs/ Policy

Table 5-3 lists Owen County's fire departments and respective information.

Table 5-3: Listing of Fire Departments, Ratings, and Number of Firefighters

| Fire Department | Fire Insurance Rating | Number of Firefighters |
|-----------------------------------|-----------------------|------------------------|
| Cataract Fire Department | 9 | 15 |
| Clay Township Fire Department | 9 | 20 |
| Coal City Fire Department | 9 | 15 |
| Franklin Township Fire Department | 9 | 15 |
| Gosport Fire Department | 9 | 22 |
| Owen Valley Fire Department | 6 | 28 |
| Patrickburg Fire Department | 9 | 27 |

5.1.6 Land Use Plan

Owen County's land use plan was adopted on November 21, 1992. The Town of Spencer also has a separate land use plan—Title XV: Land Usage—for the town's corporate boundaries. It was adopted on June 16, 2008.

5.1.7 Building Codes

Owen County's building codes were adopted in May 2003; Spencer's building codes—Title XV: Land Usage: Chapter 150 Building Regulations—were adopted June 16, 2008.

5.2 Mitigation goals

In Section 4 of this plan, the risk assessment identified Owen County as prone to seven hazards. The MHMP committee members understand that although hazards cannot be eliminated altogether, Owen County can work toward building disaster-resistant communities. Following are a list of goals, objectives, and actions. The goals represent long-term, broad visions of the overall vision the county would like to achieve for mitigation. The objectives are strategies and steps that will assist the communities to attain the listed goals.

Goal 1: Lessen the impacts of hazards to new and existing infrastructure

- a) Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.
- b) Objective: Equip public facilities and communities with means to guard against damage caused by secondary effects of hazards.
- c) Objective: Minimize the amount of infrastructure exposed to hazards.
- d) Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county.
- e) Objective: Improve emergency sheltering in Owen County.

Goal 2: Create new or revise existing plans/maps for Owen County

- a) Objective: Support compliance with the NFIP for each jurisdiction in Owen County.
- b) Objective: Review and update existing community plans and ordinances to support hazard mitigation.
- c) Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies.

Goal 3: Develop long-term strategies to educate Owen County residents on the hazards affecting their county

- a) Objective: Raise public awareness on hazard mitigation.
- b) Objective: Improve education and training of emergency personnel and public officials.

5.3 Mitigation Actions/Projects

Upon completion of the risk assessment and development of the goals and objectives, the planning committee was provided a list of the six mitigation measure categories from the *FEMA State and Local Mitigation Planning How to Guides*. The measures are listed as follows:

- **Prevention:** Government, administrative, or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from the hazard area. Examples include acquisition, elevation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.
- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

After Meeting #3, held March 31, 2009, MHMP members were presented with the task of individually listing potential mitigation activities using the FEMA evaluation criteria. The MHMP members brought their mitigation ideas to Meeting #4, which was held April 29, 2009. The evaluation criteria (STAPLE+E) involved the following categories and questions.

Social:

- Will the proposed action adversely affect one segment of the population?
- Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?

Technical:

- How effective is the action in avoiding or reducing future losses?
- Will it create more problems than it solves?
- Does it solve the problem or only a symptom?
- Does the mitigation strategy address continued compliance with the NFIP?

Administrative:

- Does the jurisdiction have the capability (staff, technical experts, and/or funding) to implement the action, or can it be readily obtained?
- Can the community provide the necessary maintenance?
- Can it be accomplished in a timely manner?

Political:

- Is there political support to implement and maintain this action?
- Is there a local champion willing to help see the action to completion?
- Is there enough public support to ensure the success of the action?
- How can the mitigation objectives be accomplished at the lowest cost to the public?

Legal:

- Does the community have the authority to implement the proposed action?
- Are the proper laws, ordinances, and resolution in place to implement the action?
- Are there any potential legal consequences?
- Is there any potential community liability?
- Is the action likely to be challenged by those who may be negatively affected?
- Does the mitigation strategy address continued compliance with the NFIP?

Economic:

- Are there currently sources of funds that can be used to implement the action?
- What benefits will the action provide?
- Does the cost seem reasonable for the size of the problem and likely benefits?
- What burden will be placed on the tax base or local economy to implement this action?
- Does the action contribute to other community economic goals such as capital improvements or economic development?
- What proposed actions should be considered but be “tabled” for implementation until outside sources of funding are available?

Environmental:

- How will this action affect the environment (land, water, endangered species)?
- Will this action comply with local, state, and federal environmental laws and regulations?
- Is the action consistent with community environmental goals?

The development of the MHMP is the first step in a multi-step process to implement projects and policies to mitigate hazards in the county and the communities in the county. Table 5-4 presents the mitigation actions and projects.

5.3.1 Completed or Current Mitigation Actions/Projects

Since this is the first mitigation plan developed for Owen County, there are no deleted or deferred mitigation items. Table 5-4 refers to completed or ongoing mitigation actions. Table 5-4 presents the completed and ongoing mitigation actions and projects in the county.

Table 5-4: Mitigation Actions and Projects

| Mitigation Item | Goals and Objects Satisfied | Hazards Addressed | Jurisdictions Covered | Comments |
|--|--|--|-------------------------------|---|
| Install new warning sirens within the county | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Spencer, Owen County, Gosport | This project was successfully completed. |
| Procure swing gates for flood-prone roadways | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county. | Flood | Spencer, Owen County | This project was successfully completed. |
| Conduct meetings within the county to establish and maintain a comprehensive planning process. | Goal: Create new or revise existing plans/maps for Owen County Objective: Review and update existing community plans and ordinances to support hazard mitigation. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Spencer, Owen County, Gosport | This is an ongoing effort. The county is currently establishing the process and will continue to meet regularly to discuss and update as necessary. |
| Procure back-up generators in Gosport and at the wastewater plant | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities to guard against damage caused by secondary effects of hazards. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Owen County, Gosport | This project was successfully completed. |
| Purchase and distribute weather radios to distribute amongst schools | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm | Spencer, Owen County, Gosport | This project was successfully completed and 30 radios were distributed. |
| Establish a volunteer committee and CERT teams to address hazard situations | Goal: Develop long-term strategies to educate Owen County residents on the hazards affecting their county Objective: Raise public awareness on hazard mitigation. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Spencer, Owen County, Gosport | This project was successfully completed. |
| Compile a database of special needs residents in the community who would need specialized assistance in a hazard event | Goal: Create new or revise existing plans/maps for Owen County Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Spencer, Owen County, Gosport | This project was successfully completed, and the Health Department maintains the database. |

| Mitigation Item | Goals and Objects Satisfied | Hazards Addressed | Jurisdictions Covered | Comments |
|--|--|------------------------|-----------------------|--|
| Create countywide maps to show gas and water pipelines | Goal: Create new or revise existing plans/maps for Owen County Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies. | Hazmat, Ground Failure | Owen County | This project was successfully completed, and the Health Department maintains the database. |

5.4 Implementation Strategy and Analysis of Mitigation Projects

Implementation of the Mitigation Plan is critical to the overall success of the Mitigation Planning Process. The first step is to decide based on many factors, which action will be undertaken first. In order to pursue the top priority first, an analysis and prioritization of the actions is important. Some actions may occur before the top priority due to financial, engineering, environmental, permitting and site control issues. Public awareness and input of these mitigation actions can increase knowledge to capitalize on funding opportunities and monitoring the progress of an action.

In Meeting #4, the planning team prioritized mitigation actions based on a number of factors. A rating of High, Medium, or Low was assessed for each mitigation item and is listed next to each item in Table 5-6. The factors were the STAPLE+E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria listed in Table 5-5. For each mitigation action related to infrastructure, new and existing infrastructure was considered. Additionally, the mitigation strategies address continued compliance with the NFIP. While an official cost benefit review was not conducted for any of the mitigation actions, the estimated costs were discussed. The overall benefits were considered when prioritizing mitigation items from High to Low. An official cost benefit review will be conducted prior to the implementations of any mitigation actions.

Table 5-5: STAPLE+E planning factors

| | |
|---------------------------|---|
| S – Social | Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values. |
| T – Technical | Mitigation actions are technically most effective if they provide a long-term reduction of losses and have minimal secondary adverse impacts. |
| A – Administrative | Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding. |
| P – Political | Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action. |
| L – Legal | It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action. |
| E – Economic | Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund. |
| E – Environmental | Sustainable mitigation actions that do not have an adverse effect on the environment, comply with federal, state, and local environmental regulations, and are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound. |

For each mitigation action related to infrastructure, new and existing infrastructure was considered. Additionally, the mitigation strategies address continued compliance with the NFIP. While an official cost benefit review was not conducted for any of the mitigation actions, the estimated costs were discussed. The overall benefits were considered when prioritizing mitigation items from High to Low. An official cost benefit review will be conducted prior to the implementations of any mitigation actions. Table 5-6 presents mitigation projects developed by the planning committee.

Table 5-6: Mitigation Strategies

| Mitigation Item | Goals and Objects Satisfied | Hazards Addressed | Jurisdictions Covered | Priority | Comments |
|--|--|--|-------------------------------|----------|---|
| Harden critical facilities, especially fire stations and schools | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Ground Failure | Spencer, Owen County, Gosport | High | The County EMA will oversee the implementation of this project. Local resources will be used to identify the required structures to be hardened. Funding has not been secured as of April 2009, but the pre-disaster mitigation program and community development grants are possible funding sources. Implementation of this project will begin within one year. |
| Procure 11 generators for all critical facilities, e.g. fire departments, nursing homes, and schools | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in Owen County. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Ground Failure | Spencer, Owen County, Gosport | High | The County EMA will oversee the implementation of this project. Local resources will be used to determine which facilities should receive generators. Funding has not been secured as of April 2009, but the pre-disaster mitigation program and community development grants are possible funding sources. If funding is available, this project is forecasted to begin within one year. |
| Work with utility companies for additional fire department training regarding handling of live power lines | Goal: Develop long-term strategies to educate Owen County residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Ground Failure | Spencer, Owen County, Gosport | Low | The EMA will work with local utility companies to implement this project. Local resources will be sought for possible funding. Implementation, if funding is available, will begin within five years. |
| Conduct a study to determine which buildings are out of date regarding building codes | Goal: Create new or revise existing plans/maps for Owen County Objective: Review and update existing community plans and ordinances to support hazard mitigation. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Ground Failure | Spencer, Owen County, Gosport | High | The County Surveyor will work with the County EMA to evaluate the current conditions of area buildings. Funding has not been secured as of April 2009, but county, state, and federal funding will be sought. If funding is available, the project is forecasted to begin within one year. |
| Construct a new Emergency Operation Center | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Owen County | High | The County EMA will oversee the implementation of this project. Funding has not been secured as of April 2009, but the pre-disaster mitigation program and community development grants are possible funding sources. Implementation, if funding is available, will begin within one year. |
| Install additional warning sirens in Jordan Village and northeast Spencer | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Spencer | Low | The County EMA oversees the implementation of the project. Local resources will be used to install and maintain the warning system. Additional funding will be sought from other funding sources, e.g. PDM program, to expand the warning system coverage area. Implementation, if funding is available, is forecasted to begin within five years. |

| Mitigation Item | Goals and Objects Satisfied | Hazards Addressed | Jurisdictions Covered | Priority | Comments |
|---|--|--|-------------------------------|----------|--|
| Institute Reverse 911 | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Evaluate and strengthen the communication and transportation abilities of emergency services throughout the county. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Spencer, Owen County, Gosport | High | The County EMA oversees the implementation of the project. Local resources will be used to install and maintain the system. Additional funding will be sought from other funding sources, e.g. PDM program. Implementation, if funding is available, is forecasted to begin within one year. |
| Establish new emergency shelters in schools, at the old armory building, and at the YMCA | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Improve emergency sheltering in Owen County. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Spencer, Owen County, Gosport | Low | The County EMA will oversee the implementation of this project. Local resources and IDHS grants will be sought to procure the materials. Implementation, if funding is available, is forecasted to begin within five years. |
| Implement new plans for public education including distribution of first aid kits and weather radios and pamphlets that address the importance of retrofitting infrastructure | Goal: Develop long-term strategies to educate Owen County residents on the hazards affecting their county Objective: Raise public awareness on hazard mitigation. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm, Hazmat, Ground Failure | Spencer, Owen County, Gosport | High | The County EMA will work with area schools, healthcare facilities, and businesses to implement this project. Funding will be sought from local sources. Implementation, if funding is available, will begin within one year. |
| Identify a backup water supply | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities with means to guard against damage caused by secondary effects of hazards. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm | Spencer, Owen County, Gosport | High | The County EMA will oversee implementation of this project. Local resources will be used to conduct research and identify potential solutions. Implementation of this project will begin within one year. |
| Procure chainsaws and other equipment to use in emergency clean-up situations | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities with means to guard against damage caused by secondary effects of hazards. | Tornado, Flood, Earthquake, Thunderstorm, Winter Storm | Owen County | High | The County EMA will oversee the implementation of this project. Funding has not been secured as of April 2009, but local resources and community development grants are possible sources. Implementation, if funding is available, is forecasted to begin within one year. |
| Institute buyout program for flood-prone land areas | Goal: Create new or revise existing plans/maps for Owen County Objective: Support compliance with the NFIP for each jurisdiction in Owen County. | Flood | Spencer, Owen County | High | The County EMA oversees the implementation of the project. Local resources will be used to determine potential buyout areas. Additional funding will be sought from other funding sources such as IDHS. Implementation, if funding is available, is forecasted to begin within one year. |
| Establish a water rescue team with two boats | Goal: Create new or revise existing plans/maps for Owen County Objective: Review and update existing community plans and ordinances to support hazard mitigation. | Flood | Owen County | High | The County EMA will oversee the implementation of this project. Funding has not been secured as of April 2009, but IDHS and/or IDNR grants are possible sources of funding. Implementation, if funding is available, will begin within one year. |
| Conduct a study to research the infrastructure of Amazon and Ketchum Dams | Goal: Create new or revise existing plans/maps for Owen County Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies. | Flood | Owen County | Medium | The County EMA will work with IDNR to oversee the implementation and funding of this project. Implementation, if funding is available, is forecasted to begin within three years. |

| Mitigation Item | Goals and Objects Satisfied | Hazards Addressed | Jurisdictions Covered | Priority | Comments |
|---|--|----------------------------|-------------------------------|----------|--|
| Establish an ordinance prohibiting new development in floodplain areas | Goal: Create new or revise existing plans/maps for Owen County Objective: Support compliance with the NFIP for each jurisdiction in Owen County. | Flood | Spencer, Owen County | High | The County EMA will oversee implementation of this project. Local resources will be used to update county documents with the new ordinance. This project is forecasted to begin within one year. |
| Install swing gates in flood-prone areas | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards. | Flood | Gosport | Low | The County EMA will work with INDOT to oversee and fund this project. Implementation, if funding is available, will begin within five years. |
| Construct railroad crossing arms to protect the public against hazmat incidents | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Equip public facilities and communities with means to guard against damage caused by secondary effects of hazards. | Hazmat | Spencer, Owen County | Medium | The County EMA will oversee the implementation of this project. Funding has not been secured as of April 2009, but the PDM program or local resources are possible sources. If funding is available, implementation will begin within three years. |
| Conduct a commodity flow study | Goal: Create new or revise existing plans/maps for Owen County Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies. | Hazmat | Spencer, Owen County | High | Community planners and local government leaders will coordinate this study. Funding will be sought from county, state, and federal sources. Implementation, if funding is available, will begin within one year. |
| Increase hazmat training to include field exercises and drills | Goal: Develop long-term strategies to educate Owen County residents on the hazards affecting their county Objective: Improve education and training of emergency personnel and public officials. | Hazmat | Spencer, Owen County | High | The County EMA, working with the fire departments, will use local resources to evaluate training needs. IDHS grants and local funds will be sought to implement this project. Implementation, if funding is available, will begin within one year. |
| Bury power lines to mitigate damage from winter storm hazards | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards. | Winter Storm | Spencer, Owen County, Gosport | Low | The EMA working with the county highway department and INDOT will oversee the implementation of this project. Funding has not been secured, but additional funding will be sought from the PDM program. Implementation is forecasted to begin within approximately five years. |
| Trim trees to mitigate damage from winter storms | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Minimize the amount of infrastructure exposed to hazards. | Winter Storm | Spencer, Owen County, Gosport | High | The EMA working with the county highway department and INDOT will oversee the implementation of this project. Funding has not been secured, but additional funding will be sought from local resources. Implementation is forecasted to begin within approximately one year. |
| Update building codes to require bookshelf strapping and non-slip bases for computers | Goal: Create new or revise existing plans/maps for Owen County Objective: Review and update existing community plans and ordinances to support hazard mitigation. | Earthquake, Ground Failure | Spencer, Owen County, Gosport | High | The County EMA will work with IDHS on implementation of this project. Local resources will be used to update existing ordinances. This project is forecasted to begin within five years. |
| Install inertial valves in critical facilities | Goal: Lessen the impacts of hazards to new and existing infrastructure Objective: Retrofit critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing. | Earthquake, Ground Failure | Spencer, Owen County, Gosport | Medium | The County EMA will oversee the implementation of this project. Funding has not been secured as of April 2009, but the PDM program is a possible source. If funding is available, implementation will begin within three years. |

| Mitigation Item | Goals and Objects Satisfied | Hazards Addressed | Jurisdictions Covered | Priority | Comments |
|--|--|-------------------|-------------------------------|----------|---|
| Create a map of underground mine areas | Goal: Create new or revise existing plans/maps for Owen County Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies. | Ground Failure | Spencer, Owen County, Gosport | Medium | The County EMA will oversee the implementation of this project. Local resources will be used to create the maps. If funding is available, implementation will begin within three years. |
| Conduct a study to determine potential damage from Owen County's sinkholes | Goal: Create new or revise existing plans/maps for Owen County Objective: Conduct new studies/research to profile hazards and follow up with mitigation strategies. | Ground Failure | Spencer, Owen County, Gosport | Low | The County EMA will oversee the implementation of this project. Local resources will be used to conduct the study and research the sinkholes. If funding is available, implementation will begin within five years. |

The Owen County Emergency Management will be the local champions for the mitigation actions. The county Commissioners and the city and town councils will be an integral part of the implementation process. Federal and state assistance will be necessary for a number of the identified actions.

5.5 Multi-Jurisdictional Mitigation Strategy

As a part of the multi-hazard mitigation planning requirements, at least two identifiable mitigation action items have been addressed for each hazard listed in the risk assessment and for each jurisdiction covered under this plan.

Each of the three jurisdictions within Owen County was invited to participate in brainstorming sessions in which goals, objectives, and strategies were discussed and prioritized. Each participant in these sessions was armed with possible mitigation goals and strategies provided by FEMA, as well as information about mitigation projects discussed in neighboring communities and counties. All potential strategies and goals that arose through this process are included in this plan. The county planning team used FEMA's evaluation criteria to gauge the priority of all items. A final draft of the disaster mitigation plan was presented to all members to allow for final edits and approval of the priorities.

Section 6 - Plan Maintenance

6.1 Monitoring, Evaluating, and Updating the Plan

Throughout the five-year planning cycle, the Owen County EMA will reconvene the MHMP planning committee to monitor, evaluate, and update the plan on an annual basis. Additionally, a meeting will be held during June 2014 to address the five-year update of this plan. Members of the planning committee are readily available to engage in email correspondence between annual meetings. If the need for a special meeting, due to new developments or a declared disaster occurs in the county, the team will meet to update mitigation strategies. Depending on grant opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

The committee will review the county goals and objectives to determine their relevance to changing situations in the county. In addition, state and federal policies will be reviewed to ensure they are addressing current and expected conditions. The committee will also review the risk assessment portion of the plan to determine if this information should be updated or modified. The parties responsible for the various implementation actions will report on the status of their projects, and will include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies should be revised.

Updates or modifications to the MHMP during the five-year planning process will require a public notice and a meeting prior to submitting revisions to the individual jurisdictions for approval. The plan will be updated via written changes, submissions as the committee deems appropriate and necessary, and as approved by the county commissioners.

The GIS data used to prepare the plan was obtained from existing county GIS data as well as data collected as part of the planning process. This updated HAZUS-MH GIS data has been returned to the county for use and maintenance in the county's system. As newer data becomes available, this updated data will be used for future risk assessments and vulnerability analyses.

6.2 Implementation through Existing Programs

The results of this plan will be incorporated into ongoing planning efforts. Many of the mitigation projects identified as part of this planning process are ongoing. Owen County and its incorporated jurisdictions will update the zoning plans and ordinances listed in Section 5 (Table 5-2) and Section 1 (Table 1-4) as necessary and as part of regularly scheduled updates. Each community will be responsible for updating its own plans and ordinances.

6.3 Continued Public Involvement

Continued public involvement is critical to the successful implementation of the MHMP. Comments from the public on the MHMP will be received by EMA Director Jack White and forwarded to the MHMP planning committee for discussion. The public will be notified of periodic planning meetings through notices in the local newspaper. Once adopted, copies of this plan will be held at the County EMA office and in each incorporated jurisdiction.

Glossary of Terms

A

AEGL – Acute Exposure Guideline Levels

ALOHA – Areal Locations of Hazardous Atmospheres

B

BFE – Base Flood Elevation

C

CAMEO – Computer-Aided Management of Emergency Operations

CEMA – County Emergency Management Agency

CEMP – Comprehensive Emergency Management Plan

CPRI – Calculated Priority Risk Index

CRS – Community Rating System

D

DEM – Digital Elevation Model

DFIRM – Digital Flood Insurance Rate Map

DMA – Disaster Mitigation Act

E

EAP – Emergency Action Plan

ERPG – Emergency Response Planning Guidelines

EMA – Emergency Management Agency

EPA – Environmental Protection Agency

F

FEMA – Federal Emergency Management Agency

FIRM – Flood Insurance Rate Maps

FIS – Flood Information Study

G

GIS – Geographic Information System

H

HAZUS-MH – **H**azards **USA** **M**ulti-**H**azard
HUC – Hydrologic Unit Code

I

IDHS – Indiana Department of Homeland Security
IDNR – Indiana Department of Natural Resources
IGS – Indiana Geological Survey

M

MHMP – Multi-Hazard Mitigation Plan

N

NCDC – National Climatic Data Center
NEHRP – National Earthquake Hazards Reduction Program
NFIP – National Flood Insurance Program
NOAA – National Oceanic and Atmospheric Administration

P

PPM – Parts Per Million

S

SPC – Storm Prediction Center

U

USGS – United States Geological Survey

APPENDIX A

MINUTES OF THE MULTI-HAZARD MITIGATION PLANNING TEAM MEETINGS

HAZARD MITIGATION PLAN

Meeting #1

JANUARY 13, 2009

Purpose: Based upon the Federal Disaster Mitigation Act of 2000 (DMA 2000) Owen County is required to have an adopted plan in order to maintain eligibility for Federal Disaster Assistance and Funding.

Attendees:

| Name | Organization or Jurisdiction |
|----------------|------------------------------|
| Jack White | Owen County EMA |
| Denise Shaw | Economic Development |
| Vic Kinney | Historical Society |
| Joe Heinmiller | Historical Society |
| John Stantz | Town of Spencer |
| Pam Hageman | Resident |
| Jack Simmerman | Resident |
| Mike Priddy | Owen County GIS |
| Sheila Reeves | Owen County Health Dept. |

A Pre-Disaster Mitigation Grant Program (in which Owen County qualifies for) provides technical and financial assistance in the implementation of hazard measures designed to reduce injuries, loss of life, and damage and destruction of property. The “Plan” will help assist Owen County to become more preventive than re-active and contribute to future community and economic development. Throughout a five year planning cycle, the team will continue to monitor, evaluate, and update the plan based on county goals and objectives on an annual basis. In addition, a meeting is required to be held in June 2014 to address the updates. Team Members are to actively participate in the risk assessment process in lieu of matching funds that is normally required for grants. The Polis Center at Indiana University Purdue University and the Indiana Geological Survey at Indiana University will be assisting the Team with the hazard risk assessment, as well as compiling all data/information collected into a Draft Plan to be reviewed and adopted by the County Commissioner’s.

A group of members (representatives from various county departments, towns, public and private sectors) were assembled by County EMA Director, Jack White to help assist in writing a Multi Hazard Mitigation Plan for Owen County and the Town of Spencer and Gosport. Team Members include Jack White, Denise Shaw, Sheila Reeves, Mike Priddy, Jack Simmerman, Jon Stantz, Joe Heinmiller, Vic Kinney, Becky Welch, and Pam Hageman. In addition participation from neighboring counties Emergency Management Agencies (EMAs) will include Clay, Putnam, and Greene.

POLIS representatives, Dave Coats and Adam Campbell began the meeting with a brief overview explaining the process and goals of the meetings. The risk assessment will consist of three components: Hazard Identification, Vulnerability Analysis, and Risk Analysis. Owen County will be required and/or responsible for the following:

- *Attend Meetings and Provide Minutes
- *Provide GIS Data and Historical Information
- *Review and Provide Comments on the Draft Plan
- *Coordinate and participate in Public Input Process
- *Coordinate the Adoption of the Plan

A variety of planning documents from IDHS, IDNR, IGIS, FEMA, along with Owen County, Spencer and Gosport local ordinances will be used to assist with the Plan.

A county map was provided for initial review by members to help in identifying possible critical and essential facilities areas to be included in the study/plan.

In addition, Lists of Critical/Essential Infrastructure areas to be possibly identified were given to members and will be presented/reviewed at the next meeting.

These should also include the estimated cost of replacement to the facilities.

Critical/Essential Facilities to be considered are schools, medical care facilities, fire stations, police stations, EOC's, commercial/industrial sites, government, religious, agriculture, roadways/bridges, water-wastewater, and residential.

The map will be posted at the Courthouse (Mapping Office and Spencer Municipal Building) for further review. Any corrections are to be given to the POLIS representatives. A website for Team Members was given to provide additional documents and schedules.

Meeting concluded.

Owen County Pre-Disaster Mitigation Meeting

MEETING 2

Tuesday, February 17, 2009 at 6:00 p.m.

Meeting #2 of the Owen County Pre-Disaster Mitigation (PDM) Committee was held Tuesday, February 17, 2009 at the Owen County Courthouse, 60 South Main Street, Spencer, IN 47460. Those present are listed in the following table.

| Name | Organization or Jurisdiction |
|----------------|--|
| Dave Coats | The Polis Center |
| Adam Campbell | The Polis Center |
| Pam Hageman | Indiana Rural Community Assistance Program - Spencer |
| Jack White | Owen County EMA |
| Vic Kinney | N/A |
| Joe Heinmiller | N/A |
| Mike Priddy | GIS Coordinator |
| Jack Simmerman | Spencer Town Council |
| Sheila Reeves | Owen County Health Department |
| John Stantz | Spencer Town Council |

Dave Coats and Adam Campbell passed out copies of Owen County's historical hazards for the team to review. The document listed the hazards and respective dates, types, locations, damages, and general description. In addition to the hazard data, Adam presented a map with plotted historical hazard events and county infrastructure.

Dave explained that the team would use the handout and the map to prioritize risk levels per hazard for each jurisdiction (County, Spencer, and Gosport). The basis for prioritization is likelihood of the occurrence multiplied by magnitude of damage.

Next, Adam described which hazards would be analyzed in the risk assessment.

- Earthquake: The epicenter will be at East Spencer-North Park (46E)
- Tornado: The analysis will model an F4 through Freedom/Spencer/Gosport—a path that naturally follows the river.
- Hazardous Materials: Transportation is the most likely catalyst for a spill. The identified area to model is Main Street through town to the high school. Jack White has a current hazmat list of underground storage tanks. The group also discussed concerns involving coal mines.

Mike Priddy will work with Adam to supply lists/plots and GeoMaps (Neil's Dump – River Camp Road?)

- Floods: Polis will use FEMA's 100-year flood maps. The group discussed potential areas for flash flooding: E. Franklin Street, 911 West Hillside Avenue, Rattlesnake Creek, Cunot/Jackson Township area (Bullerdick Road), 246 West Skank's Bottoms (Fish Creek). Priddy has created a flood layer, which he will pass to Adam.

The group also discussed hazards that will not be modeled in HAZUS-MH:

- Dam Failure: Areas of concern include roads and homes near Hollybrook, Amazon, and Locust dams.
- Drought: No concern

Polis distributed a Hazards Matrix, and based on the previous discussion, the team ranked the hazards as follows:

| | County | Spencer | Gosport |
|---------------|--------|---------|---------|
| Dam Failure | 6 | 6 | 6 |
| Earthquake | 5 | 3 | 3 |
| Flood | 2 | 1 | 4 |
| Thunderstorms | 3 | 4 | 2 |
| Winter Storms | 4 | 5 | 5 |
| Tornadoes | 1 | 2 | 1 |

Based on the information given, Polis will model a new map with data provided of critical infrastructure or Meeting 1 worksheets and the ranking list discussed tonight.

The planning committee is required to hold a public meeting in approximately six weeks. During the meeting, Polis will present a PowerPoint presentation to show the new map and revisions. All major entities should be invited to attend including the general community, town council, fire and police departments, and media sources. (ADVERTISE!) Jack White will get a public announcement template from Polis.

The meeting adjourned at 8:00 p.m. The next meeting will be held on Tuesday, March 31, 2009 at 6:00 p.m. in the Owen County Courthouse Commissioners Room.

| Committee Hours as of February 17, 2009 | |
|---|-----------------|
| Member | Number of Hours |
| Jack White | 10 |
| Jack Simmerman | 6 |
| Joe Heinmiller | 8 |
| Denise Shaw | 6 |
| Loren | 2 |
| Pam Hageman | 2 |
| Vic Kinney | 3 |
| Mike Priddy | 4 |
| John Stantz | 4 |
| Shelia Reeves | 10 |

**HAZARD MITIGATION PLAN COMMITTEE
MEETING #3 MINUTES
MARCH 31, 2009**

Purpose: To review an extensive preliminary hazard mitigation plan for the county and prioritize strategies appropriate to the risk posed by each hazard.

Attendees:

| Name | Organization or Jurisdiction |
|--------------|-------------------------------------|
| Jack White | Owen County EMA |
| Denise Shaw | Economic Development |
| Vic Kinney | Historical Society |
| Cynthia Hyde | Town of Spencer |
| John Stantz | Town of Spencer |
| Mike Stanley | Spencer Evening World |
| Darin Crum | Owen County Sheriff's Department |
| Mike Priddy | Owen County GIS |
| Becky Welch | Town of Gosport |

Committee Members reviewed data and statistical information presented by Polis Center Representative, Dave Coats. In previous meetings, the different types of hazards were identified. The risk assessments were designed to help develop some ideas and strategies where the county would be able to seek federal assistance and reducing the likelihood of damages occurring if these events were to happen.

Adam Campbell, Polis Centers Geographical Information Systems Manager offered additional information to provide insight about possible disasters which could occur in the next 50 to 100 years. The extensive 94 page preliminary plan covers past storm systems and damages occurring within the county according to the National Climatic Data Center. This data will be used in an effort to evaluate all risks factors to help finalize the county's master plan.

Mr. Coats reminded members that their participation in the project means Owen County is eligible for funding to assist in projects identified through the provided plan to curb possible damages. This includes Owen County as a whole; as well as the incorporated jurisdictions of Spencer and Gosport.

In the prior meetings the hazards most likely to occur were identified as flooding, thunderstorms, tornadoes, winter storms, earthquakes, hazmat and dam or levee failure. Continued plan assessment and review will be continued at the next meeting on April 29th at 6:00pm.

HAZARD MITIGATION PLAN
Meeting #4
APRIL 29, 2009

Purpose: To identify existing plans and mitigation capabilities within all of the communities and determine activities that can be improved in order to more effectively reduce the impact of future hazards.

Attendees:

| Name | Organization or Jurisdiction |
|----------------|-------------------------------------|
| Jack White | Owen County EMA |
| Joe Heinmiller | N/A |
| Jack Simmerman | Spencer Town Council |
| Sheila Reeves | Owen County Health Department |
| John Stantz | Spencer Town Council |

Based upon the seven hazards-risk assessments that have been identified and/or discussed thus far; Team Members worked with POLIS representatives to identify overall Goals and Objectives for all hazard types. These included policies, regulations, procedures, programs, projects that contribute to the lessening of disasters.

1. New and Existing Infrastructure Objectives
 - *Minimize the amount of infrastructure exposed to hazards
 - *Equip facilities with the means to guard against damage caused by secondary effects of hazards
 - *Improve/Require critical facilities with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.
 - *Strengthen the communication and transportation abilities of emergency services throughout the county
 - *improve emergency sheltering in the county
2. New and Revised Plans-Maps
 - *Compliance with National Flood Insurance Program
 - *Update existing plans and ordinances to support mitigation
 - *Review/Conduct new studies to identify hazards
3. Develop Long-term Strategies
 - *Raise Public Awareness on the various hazards
 - *Provide education and training for emergency personnel and public officials

Annual meetings will be required as many of the projects identified are ongoing and thus will require updates to the plan. These meetings will be assembled by the EMA Director. POLIS representatives were to compile all strategies and add to the “Draft Plan” for review by the team.

The Team will hold its fifth meeting to adopt and/or make any last necessary changes before the final adoption with the County Commissioner's.

Meeting concluded.

**HAZARD MITIGATION PLAN COMMITTEE
MEETING #5 MINUTES
JUNE 18, 2009**

Purpose: To review Draft Copies of the Mitigation Plan that had been provided by POLIS Representatives before final adoption.

Attendees:

| Name | Organization or Jurisdiction |
|----------------|-------------------------------------|
| Jack White | Owen County EMA |
| Vic Kinney | Historical Society |
| Jack Simmerman | Spencer Town Council |
| Sheila Reeves | Owen County Health Department |
| John Stantz | Spencer Town Council |
| Mike Priddy | Owen County GIS |
| Becky Welch | Town of Gosport |

Members reviewed the draft copies and suggested only minor changes to be made. By a unanimous vote; a master copy was noted with said changes and will be given to the Polis Representatives to be finalized. Emergency Management Director, Jack White will provide them with the corrected draft copy. Mr. White will also be responsible for reviewing the final copy to assure the changes were made.

In addition, he will also make arrangements to attend the appropriate County Commissioner's Meeting to present the plan for adoption. Upon adoption; copies will be made available to committee members as well as public/elected officials, and various county agencies.

Members also discussed the need for future meetings to review and or make any necessary changes. The Emergency Management Director will make the notification if/when needed.

No further discussions were made.

Meeting Adjourned.

APPENDIX B

ARTICLES PUBLISHED BY LOCAL NEWSPAPER

County Hazard Mitigation Meeting Tonight In Spencer

The Owen County Hazard Mitigation committee will hold a meeting, open to the general public, today, Tuesday, beginning at 6 p.m. in the Commissioners' Room, located on the second floor of the Owen County Courthouse in Spencer.

About 30 Taken To Armory...

Rescue Teams Work Throughout The Night To Rescue Owen Residents

Even Snow-Mobiles Had Problems

Rescue was the major term being used by law enforcement officers, National Guard and civilian volunteers here in Owen County Thursday as blizzard conditions remained throughout the state. About 30 residents were housed in the Spencer Armory early today.

Snow-mobiles, 4-wheel drive vehicles and numerous volunteers worked for hours Thursday evening and on through the night removing residents from unheated homes as well as other emergency situations.

One of the earliest runs involved four 4-wheel drive units and a snow-mobile owned by Bob Maegerlein. That effort involved a trip to the Arney community where 82-year-old John Hulett was reported to be alone in his home, without heat since late Wednesday.

Other unsuccessful attempts had been made to reach the home about four miles north of Worthington. The snow-mobile

became stalled in a four foot drift some distance from the residence but as men continued to work toward the house it was learned a nearby farmer had rescued Mr. Hulett just a few minutes earlier with a farm tractor...and he was safe.

Later Thursday a concentrated effort was underway to rescue several people in three families from Algood Trailer Court near Whitehall where electric service had been out for more than 24 hours.

The residents were scheduled to be reached by 4-wheel drive vehicles but as of 9 p.m. Thursday four units were stuck in their attempt to reach the mobile homes. The trucks and rescue team, Sgt. Steve Cradick, Deputy Mike Hendricks, Conservation Officer Bob McIntire, Deputy Paul Poorman and Reserve Deputy Jack Steele found the entry process a major chore despite help from the Owen County Highway Department.

Shortly after 11 p.m. a decision was made to call in a snow-mobile owned by Clarence McHenry to aid in the job. The plan involved taking the nine to the Clay Township Fire Department for immediate relief then to be met by a National Guard vehicle for the long-snow-drift trip back to Spencer.

According to Boruff the job was completed late Thursday with all of the people, 4 adults and 6 children, reported to be in cold, but good condition.

Earlier, about 8 p.m., another family by the name of Cullison made their way from

Armory was "home" for 15 persons and more were expected from other rescue work, including the troublesome project near Whitehall.

Reports of an eight foot drift on Hardscrabble Road gave good indications of why 4-wheel drive units were having troubles and Deputy Bill Boruff at the Sheriff's office was still warning all residents to stay in their homes.

Late Thursday night Frank Blaney and Conservation Officer Dan Detraz were making arrangements for a double-duty run to the Pottersville Road area. First to take heating gas to the Robert Pless residence and the second to possibly rescue a man from a cold home and return to the Spencer Armory.

In line with the problem of removing residents from cold homes, it was reported power outages have been in effect for several areas of the county for more than 24 hours. The two major trouble spots seem to be in the Coal City and Pottersville Road areas...In both cases REMC trucks out of Bloomfield were working to reach the scenes throughout Thursday afternoon...but without success. Deputy Boruff admitted - information from both areas had been sketchy and the Sheriff's department was not certain how many homes were affected in each location...or if the residents had been able to receive help. Getting to both areas has been virtually impossible with only

Continued on Page 2



Letters TO THE EDITOR

Local EMS very professional

Dear Editor,

I would like to say that I have found the Owen County EMS to be very professional.

I'm sure we all would like bargains, but I know from experience that when the "old ticker" stops or breathing fades away and panic sets in...money isn't everything. Your only thought is getting help.

Search Underway for Child In Flooded River

By Kathy Ross

Rescue efforts continue today to find a 3-year-old Monroe County youngster involved in a freak boating accident on the swollen White River near the old steel bridge south of Gosport on County Line Road shortly before noon Sunday.

The missing child is James Michael Elliott who was with his mother Pamela Joe Elliott, 21, her boyfriend, Russell Lawyer, 25, and a friend David Bean, age 12, all of Bloomington. The child is described as

having brown hair and eyes, weighing between 35-40 pounds, wearing a blue shirt, checkered pants, brown shoes, and a beige raincoat. Authorities involved in the investigation revealed none of the involved were wearing jackets.

Area Conservation Officers the Owen County Sheriff's Department are conducting an investigation, and after five hours of searching the White River Sunday evening they were able to produce only

a 10 foot boat and small trolling motor. They were found near an old rail crossing about one-half mile south of the bridge where the mother had marked the spot with her coat where the boat capsized. The mother explained they had gone to the river to set out a fishing line.

The two agencies began their rescue efforts around 2:45 p.m. Sunday but the search was postponed until this morning (Monday) because of darkness. According to information obtained from the mother they had parked their vehicle north of the old steel span, and launched the small boat in flood water in a tree-covered area near the road. She revealed they went about a half mile through a maze of trees, ducked because of the low limbs, and when they raised up the youngster ducked again and fell out of the boat, causing the small boat to overturn. The mother explained her boyfriend yelled for them to grab the limbs and she told authorities she tried to grab her son's hand but the current was so swift it had taken him away. It was learned they had in the child about an hour, then left the site about 1:30 p.m. to get help. Her boyfriend took her to her parents, then took the other boy home and was supposed to go back to her parents but never returned. After a dispatch was made to the Monroe County Sheriff's Department to locate the boyfriend he arrived at the scene later Sunday evening. The mother explained to the sheriff's department that her parents waited for him but when he didn't show they looked for him. They reported the incident to the Monroe County authorities, who with the help of the Ellettsville Police Department, escorted the family to the Owen County Sheriff's Department. The mother also explained when she changed clothes she noticed her watch had stopped at 12:05 p.m.

According to the sheriff's department Conservation officers Dan Detraz and Dennis Koontz took the mother to locate the area where the boat

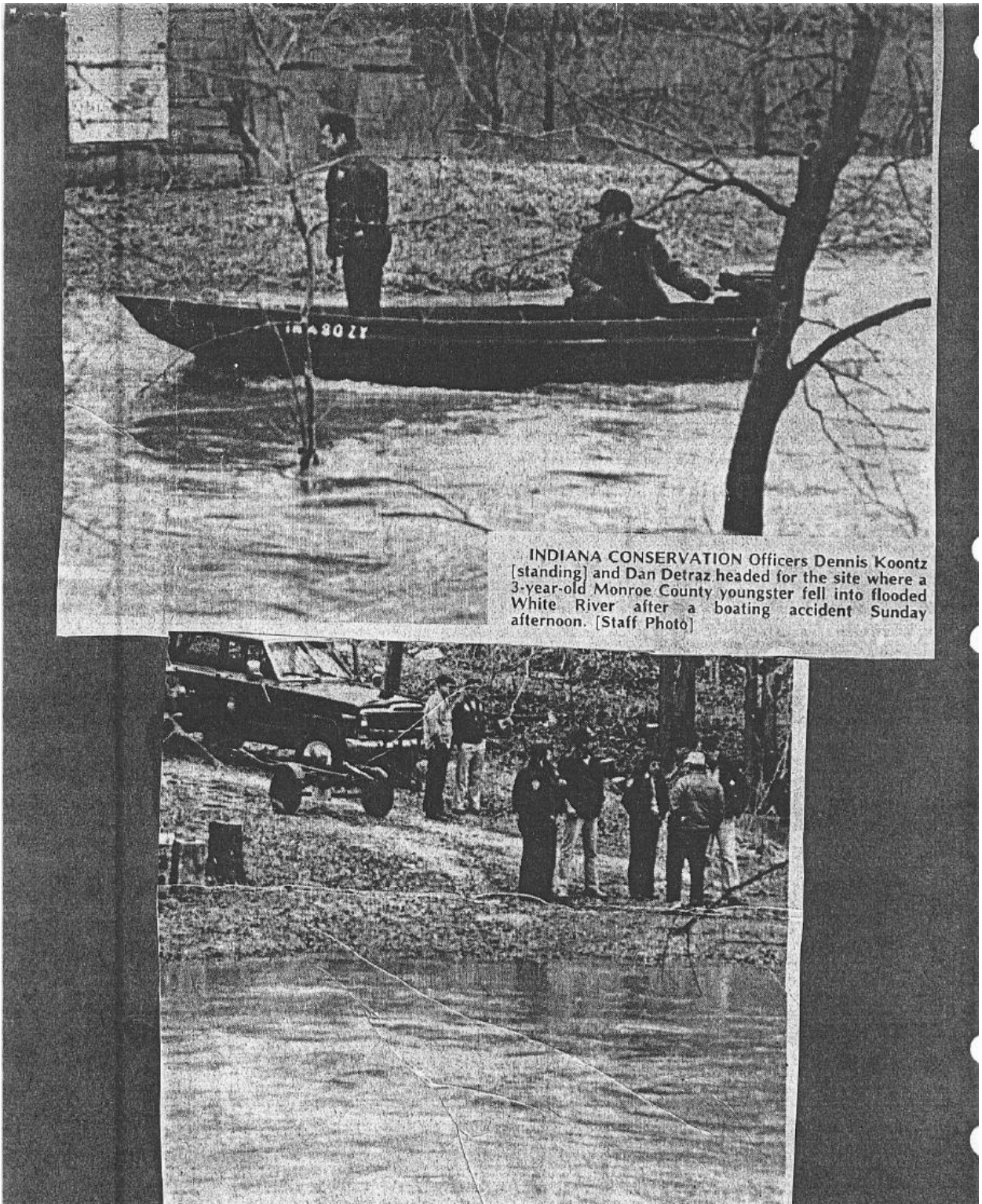
remembering the exact site. She described the location where there was a house with a "no trespassing sign" near it and the officers surmised it was the old steel bridge south of Spencer. When they drove there, however, she revealed it wasn't the location because she remembered a gray house not a white one and conservation officers decided it was the bridge on County Line Road. Officers explained when they were enroute to the site she spotted the river from the road "tears came to her eyes and she recognized the location."

The sheriff department's report revealed the mother got in the boat with Conservation officers Detraz and Koontz and located the site where the child went under, which she had marked earlier with her coat, and she was returned to shore. Officers recovered the capsized boat close to where the child fell into the river. The two Conservation officers and Owen County Deputy Sheriff Paul Evans and Deputy Reserve Jack Steele paired off and took the boat and searched the north and south sides of the swollen river. Evans said they also looked in the boat and under it in case the child was there.

Officers used various dragging equipment in their attempt to find the body but their efforts were hampered due to the swift current, tree limbs, and the high water which was listed at 17.5 feet .3 1/4 feet above flood stage. Officers also discussed if the child's clothing was bright enough to be spotted by a helicopter and they agreed it was not.

Deputy Evans explained, "When we first went out we were working with markers and a rope, and a pair of field glasses and scanned both sides of the river about a mile from the boat."

He explained only a corner of the boat was showing when they found it and it was about fifty yards below the spot the mother had marked with her coat. When rescue efforts were first initiated Spencer Deputy Marshal Susan Sachtjen was dispatched to the Dunn Memorial Bridge east of Spencer.



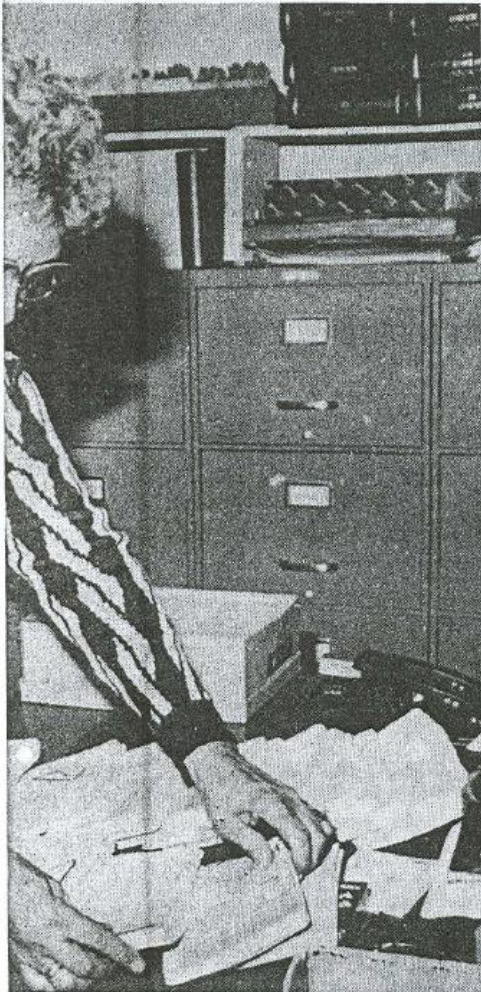
INDIANA CONSERVATION Officers Dennis Koontz [standing] and Dan Detraz headed for the site where a 3-year-old Monroe County youngster fell into flooded White River after a boating accident Sunday afternoon. [Staff Photo]

WORLD

AND BEST INTEREST OF OWEN COUNTY *

FRIDAY, NOVEMBER 6, 1987

NUMBER 93



Over 1,000 voter cards of county citizens who have been sent voter purge cards but have not (Chris Banguis)

Urges Purge Cards

sign the purge rate she is receiving purge cards, to the clerk's the county could see a significant

Fire Danger Jumps To Code 5

By Kevin Kleine

Spokesmen for each of the volunteer fire departments in Owen County have reissued strong warnings against any outdoor burning until further notice, and the Indiana Department of Natural Resources has raised the fire alert from yesterday's Code 4 to a Code 5 in response to extremely dry conditions.

Township volunteer firefighters responded to four grass and wood fire calls yesterday (Thursday), and a number of VFD officials made pleas for residents to refrain from starting any fires outdoors.

Phil Wagner, training director for the Indiana Department of Natural Resources, said this morning that a Code 5 warning has been issued, which means that the danger of fire is extremely high. The Code 5 level is the highest in the warning system and is rarely reached in the midwest.

Wagner indicated that the Code 5 went into effect on Thursday afternoon around 2 p.m., and will remain in effect until further notice, or until the area sees some measureable precipitation. "We expect scattered showers this weekend, but that may not be much help. Some areas will be getting rain, while others will remain dry," he stated.

Wagner indicated that activity has been slow so far this morning, and that no helicopter air patrols are currently operating. "We've had an unexpected cloud cover this morning which helped a bit," he explained, "but we still have the low relative humidity. We may have problems if the wind picks back up this afternoon."

Terry Coleman, assistant property manager at McCormick's Creek State Park, said today that the park hasn't had any problem with fires. But that DNR officials have banned all fires in any DNR

Owen County Heavy Snow, 45 MPH Winds And -50 Wind Chill Turn Area Into Nightmare

Man Badly Hurt, Rescue Truck Totaled In Mishaps During Storm



staff photo/David Schreiber

An Owen County Emergency Medical Service ambulance on its way to Bloomington Hospital slid into a ditch Saturday afternoon to avoid a stalled motorist. The

ambulance, driven by Tony Morrison, 511 Meadow Drive, Spencer, was carrying the body of a heart attack victim who had died at his home in Whitehall. No injuries were reported caused by the accident.

Also Flue Fire Reported

Major Damage In Service Station Fire

Spencer and Clay Township Volunteer firemen had to battle two separate blazes in sub-zero temperatures late Wednesday night with the Spencer Department being dispatched to a blaze at a local business, and Clay township to a residence fire on Porter Edge Road.

Cleveland's Phillip's 66 Station on North Fletcher Avenue

was the scene of a fire in the attic area of the station, reported to the Spencer Fire Department at about 10:30 p.m. Two units were used to fight the blaze which took firemen about an hour to get under control.

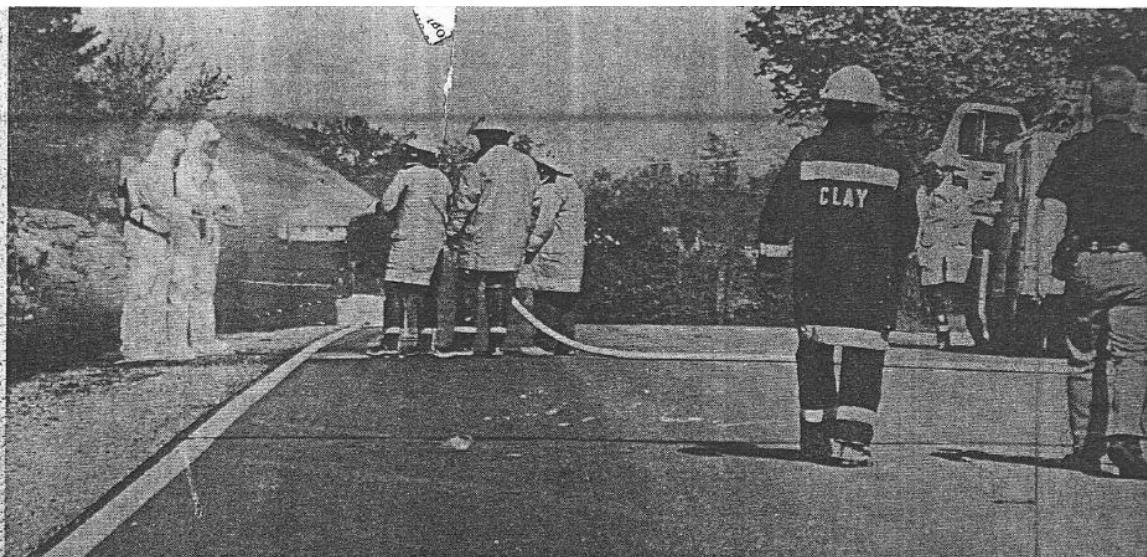
Spencer Fire Chief Don Edwards said the fire ignited as the result of apparent overheating near a furnace pipe in

an attic section. He explained firemen had to chop a through the roof to get to problem.

Chief Edwards said station sustained heavy structural damage around the and ceiling where the fire broke out. He said there not much damage to

Continued on page 3





SPENCER EVENING WORLD Tuesday, May 3, 1988

Chemical Spill Causes A Major Tie-Up On 46 East

Owen Valley volunteer firemen Larry Provines and Rick Shields are pictured above as they were hosed down after handling a container that had fallen off a Farm Bureau Co-op truck on Indiana 46 Monday at about 3:30 p.m., spilling about 200 gallons of chemical herbicide on the road.

The chemical was being transported from Martinsville to Spencer in a Farm Bureau pick-up truck when the container fell from the truck bed. Authorities say they do not know how the accident occurred.

authorities set up road blocks at the east edge of Spencer and on County Line Road, immediately east of the spill.

The chemical was Lasso Atrazine, a crop herbicide and was deemed a non-hazardous material, according to the Indiana State

Police. Still, The Owen Valley Volunteer Fire Department and other

Continued on page 3

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Photo by Chris

APPENDIX C

ADOPTING RESOLUTIONS

Resolution # 2010-01

ADOPTING THE OWEN COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, Owen County recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

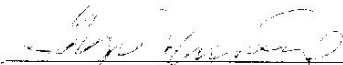
WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

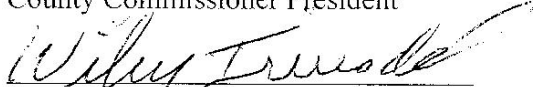
WHEREAS, Owen County participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Owen County Commissioners hereby adopt the Owen County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Owen County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Indiana Department of Homeland Security and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 29 Day of January, 2010.


County Commissioner President


County Commissioner


County Commissioner


Attested by: County Auditor

Resolution # 2010-01

ADOPTING THE OWEN COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Town of Gosport recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Gosport participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town of Gosport hereby adopts the Owen County Multi-Hazard Mitigation Plan as an official plan; and


BE IT FURTHER RESOLVED, that the Owen County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Indiana Department of Homeland Security and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 12th Day of January, 2010.


Town President


Town Council Member


Town Council Member


Attested by: Town Clerk

Resolution # 2010-1

ADOPTING THE OWEN COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the Town of Spencer recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted multi-hazard mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, the Town of Spencer participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED, that the Town of Spencer hereby adopts the Owen County Multi-Hazard Mitigation Plan as an official plan; and

BE IT FURTHER RESOLVED, that the Owen County Emergency Management Agency will submit on behalf of the participating municipalities the adopted Multi-Hazard Mitigation Plan to the Indiana Department of Homeland Security and the Federal Emergency Management Agency for final review and approval.

ADOPTED THIS 20 Day of January, 2010.

Jim C. Slaf
Town President

Cynthia D. Heyle
Town Council Member

Lee Bruce
Town Council Member

W. J. DeBoer
Attested by: Town Clerk

APPENDIX D

HISTORICAL HAZARDS FROM NCDC

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|-----------|-----------|----------|-----|-----|------|-----|---------------|
| Owen | 6/11/1955 | Tornado | F1 | 0 | 0 | 3K | 0 | None Reported |
| Owen | 3/14/1957 | Tornado | F0 | 0 | 0 | 0K | 0 | None Reported |
| Owen | 4/1/1959 | Tornado | F | 0 | 0 | 3K | 0 | None Reported |
| Owen | 4/21/1967 | Hail | 0.00 in. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 4/21/1967 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/24/1973 | Tornado | F1 | 0 | 0 | 3K | 0 | None Reported |
| Owen | 4/18/1975 | Tornado | F2 | 0 | 1 | 250K | 0 | None Reported |
| Owen | 3/20/1976 | Hail | 1.25 in. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/24/1976 | Tornado | F2 | 0 | 0 | 250K | 0 | None Reported |
| Owen | 8/8/1977 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 8/8/1977 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/1/1978 | Tornado | F1 | 0 | 0 | 0K | 0 | None Reported |
| Owen | 6/20/1979 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 5/12/1980 | Hail | 1.50 in. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/19/1980 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/19/1980 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/28/1980 | Tornado | F1 | 0 | 0 | 0K | 0 | None Reported |
| Owen | 6/28/1980 | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 8/2/1980 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 4/3/1982 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 5/31/1982 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 8/29/1985 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 8/30/1985 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 3/10/1986 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 3/10/1986 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 7/25/1986 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|-----------|----------|-----|-----|-----|-----|---|
| Owen | 7/25/1986 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 5/20/1987 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 5/30/1987 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/13/1987 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/13/1987 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 8/3/1988 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 5/19/1989 | Tornado | F1 | 0 | 0 | 25K | 0 | None Reported |
| Owen | 8/23/1989 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 5/9/1990 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 5/16/1990 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 8/29/1990 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 11/30/1991 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 11/22/1992 | Hail | 1.75 in. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 10/29/1993 | Snow | N/A | 0 | 0 | 0 | 0 | Snow of two to six inches fell across the southern half of Indiana. The snow began in southwest Indiana during the evening of October 29, and spread northeast during the night. Snow ended in southwest Indiana during the morning of October 30, but continued in the southeast part of the state for much of the day. The heaviest snow fell in a band from Evansville to near Cincinnati, Ohio, with the greatest amounts of around six inches reported in the southeast corner of the state. Evansville set a new 24 hour snowfall record for October with 4.10 inches from the 29th to the 30th. Evansville also experienced its second snowiest October on record with a total of 4.60 inches. The only October with more snow at Evansville was in 1925, with a total of five inches. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|-----------------|-----|-----|-----|------|------|---|
| Owen | 11/14/1993 | Flood | N/A | 0 | 0 | 5.0M | 500K | The flash flood event on November 14 developed into a widespread major flood event over central and southern Indiana during the third week of November. The heavy rain on November 14 was followed by an additional 1.50 to 2.50 inches of rain from November 16 to November 17. Flooding in much of central and southern Indiana was reminiscent of the late December 1990 and early January 1991 flood. Flood levels in portions of the state exceeded the late December 1990 and early January 1991 flood, and were the highest experienced in 50 or more years. Over 1,000 people were forced to flee their homes, and the Indiana Department of Natural Resources made numerous rescues of hunters and stranded residents. The White River in Greene County crested at its highest level since May 1943. The White River at Edwardsport in northeast Knox County set a new record stage. Levees constructed since March 1913 prevent flooding of thousands of acres of farmland along this portion of the White River. As a result of the levees, the White River now rises higher in this area during large floods. The November 1993 flood at Edwardsport was estimated to contain only 60% of the March 1913 flood discharge. The Whitewater River caused widespread flooding at Connersville in Fayette County, and at Laurel in Franklin County. State Emergency Management reported that 51 houses and 21 mobile homes sustained major damage statewide, with 90 houses and 17 mobile homes sustaining minor damage. Because of advance warning, relocation of some residents and structures, prompt flood response and improved flood protective works, flood damage was substantially reduced when compared to the late December 1990 and early January 1991 flood. Monetary savings easily exceeded two million dollars. Because of flood warnings protective actions were undertaken in the following communities: Muncie, Anderson, Noblesville, Clare, Strawtown, Trails End, Ravenswood, Waverly, Spencer, Elora, Edwardsport, Smithville, East Mount Carmel, New Harmony, Shelbyville, Columbus, Edinburgh, Seymour, Fort Ritner, Bedford, Williams, Shoals, Connersville, Laurel, Martinsville, Terre Haute, and the southern portions of Indianapolis. |
| Owen | 1/14/1994 | Extreme Cold | N/A | 3 | 0 | 5.0M | 0 | Bitter cold weather settled over Indiana during the third week of January. Many locations recorded daily minimum temperatures below zero each day from January 14 to January 21. The coldest temperatures were recorded on the morning of January 19, when a new record minimum for the state of Indiana was established with a reading of -36 at the National Weather Service cooperative weather station at New Whiteland in Johnson County. Other record low temperatures recorded on the 19th included an all time record low of -27 at Indianapolis, and record lows for the day of -17 at Evansville, -18 at Fort Wayne, and -21 at South Bend. Some locations with official temperatures of -30 or colder on the 19th included Cambridge City with -35, Martinsville with -35, Spencer with -33, the Bloomington Airport with -33, Salem with -32, Rushville with -31, and Brookville with -31. Three people in Vanderburgh County died as a result of the extreme cold. A 79 year woman died from hypothermia in her home, a 77 year old male man died from exposure while working on his farm, and a 46 year old male froze to death after he passed out in his car. (F79P)(M77O)(M46V) INZ030-032>092,16,1600EST-* Central and,17,1200EST,,,0,?,5,0,Heavy Snow/Ice Storm Southern Indiana A major winter storm brought heavy snow to central and southern Indiana. In parts of southern Indiana one-quarter to one-half inch of freezing rain accumulated before the precipitation changed to snow. Most of central and southern Indiana received between six and nine inches of snow. However, heavier amounts fell in extreme southern Indiana, with 16 inches being reported over Harrison, Floyd, and Clark Counties, and close to a foot of snow being reported over the southern parts of Spencer and Perry Counties. Many businesses and schools were closed for several days following the storm, with some schools remaining closed for an entire week. Many roads in southern Indiana were impassable for several days following the storm. IOWA |
| Owen | 2/8/1994 | Sleet/ice Storm | N/A | 0 | 0 | 500K | 0 | A mixture of snow, sleet, and freezing rain fell over northern Indiana, with mostly sleet and freezing rain in the south. Most of the significant sleet and freezing rain occurred south of a line from Lafayette to Marion, and north of a line from Vincennes to Madison. Freezing rain in south-central and southeast Indiana resulted in ice accumulations of up to one inch. The ice downed power lines and damaged trees. In areas of central Indiana from Indianapolis to Connersville one to two inches of sleet accumulated. The sleet and freezing rain in central and southeast Indiana was accompanied by thunder and lightning at times. Numerous schools were closed in southern and central Indiana. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|------------|----------|-----|-----|------|-----|---|
| Owen | 4/12/1994 | Flood | N/A | 1 | 0 | 500K | 0 | Widespread heavy rain and embedded thunderstorms began late April 10th and continued periodically through April 12th. Several weather systems and fronts moving through Indiana produced anywhere from 3 to 7 inches of rain across much of the state in this three day period. As a result, flooding occurred across many parts of Indiana. The main exceptions were extreme north and extreme south Indiana. These areas also had heavy rains and river rises but no significant flooding. Record flooding occurred from the 12th to 15th on the Mud Pine and Sugar Creeks in Benton County, along Big Pine Creek in Benton and Warren Counties, and along the Vermilion River in Vermillion County. The Vermilion River exceeded its record flood of 1939 by 3 to 4 feet, requiring sandbagging to prevent flooding at Cayuga in Vermillion County. Other rivers, including the Wabash, White, East Fork White, Tippecanoe, Eel, Maumee, and St. Mary exceeded their banks along nearly their entire lengths for a one to two week period. Individual locations were above flood stage for a five to ten day period with the crests' gradually moving downstream. These were the highest flood waters in many of these rivers since 1991. Sandbagging was necessary in many locations. Numerous county roads and some state roads were closed for a period of time. Several bridges and roads were also washed out across Indiana. A Salem Indiana man died in flood waters, apparently when his truck was washed into a ditch with high, fast moving water. This occurred off of Indiana Highway 235 east of Medora in Jackson County. M74V |
| Whitehall | 4/27/1994 | Tornado | F1 | 0 | 0 | 50K | 0 | Small tornado briefly touched down at Whitehall destroying one mobile home, damaging one church roof, and downing several trees. |
| Owen | 6/19/1994 | Tstm Winds | 0 kts. | 0 | 0 | 5K | 0 | Trees and power lines were downed, and there was some roof damage in the Patricksburg area. |
| Owen | 11/21/1994 | High Wind | 0 kts. | 0 | 0 | 50K | 0 | An intense low pressure system over the Great Lakes and its associated cold front produced high winds across all of Indiana. Winds in excess of 50 mph were common across the state beginning near midnight in western Indiana. High winds spread to eastern Indiana by noon EST. Scattered power outages and downed trees were reported across many parts of Indiana including the South Bend, Lafayette, Indianapolis areas as well as rural areas northeast of Evansville. |
| Owen | 11/27/1994 | High Wind | 0 kts. | 0 | 0 | 120K | 0 | An intense low pressure area and its associated cold front swept across the region with high winds both before and after the cold front. The cold front itself triggered a squall line that produced damage. The high winds resulted in a roof collapse at the ATF automotive business in Indianapolis around 2 PM EST. Also, a church steeple was damaged late Sunday evening on Indianapolis' eastside. |
| Owen | 3/7/1995 | Flood | N/A | 0 | 0 | 0 | 0 | One to three inch rains fell across west-central, north-central, and northeast Indiana on the 6th and 7th. This caused minor street flooding in some counties and minor river flooding of agricultural areas. Since this was before the growing season, farmers were not impacted. |
| Owen | 4/18/1995 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 | Ham radio operators reported trees blown down by thunderstorm winds. |
| Owen | 7/13/1995 | Heat Wave | N/A | 14 | 0 | 1.0M | 0 | Heat wave conditions developed across all of Indiana. High temperatures reached between 95 and 105 degrees with heat indices between 100 and 120 degrees. The Evansville area temperatures reached or exceeded 95 degrees from July 11-17. Nearly all heat related deaths occurred in the sick or elderly populations and most occurred in northwest Indiana. Also, nearly 800,000 baby chickens died at the Rose Acre Farms in Seymour resulting in losses totaling near one million dollars. F81PH,M47PH,F71PH,F81PH,M87PH,M75PH,F65PH,M52OU,F71PH,M52PH,M72PH,M40OU,M68OU,F02PH |
| Spencer | 8/9/1995 | Hail | 0.75 in. | 0 | 0 | 0 | 0 | |
| Gosport | 8/9/1995 | Tstm Winds | 0 kts. | 0 | 0 | 0 | 0 | Numerous trees were downed. |
| Owen | 8/21/1995 | Heat Wave | N/A | 1 | 0 | 0 | 0 | Heat wave conditions initially developed over southwest Indiana on the 12th then overspread all but northwest Indiana for the remainder of the week. Heat wave conditions ended across the north and central sections on the 19th and over the south by the 21st. High temperatures were in the 90s throughout the period and near 100 |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|--------------|---------|-----|-----|-----|-----|--|
| | | | | | | | | across the south. High humidity also yielded Heat Index values between 100 and 115 degrees most of the week. These extreme conditions resulted in a heat stroke and death of an elderly male. The Indiana State Fair lost over \$400 thousand due to low turnouts and most of Indiana crops suffered some due to the heat. M72PH |
| Owen | 12/8/1995 | Winter Storm | N/A | 0 | 0 | 0 | 0 | A low pressure system and cold front swept across Indiana bringing the first significant snowfall and cold temperatures of the winter season. Though snowfall amounts only averaged from two to four inches across the state, numerous vehicle accidents occurred, several resulting in fatalities. The cold front brought the first subzero temperatures to the state and prompted wind chill advisories for all of Indiana. |
| Owen | 12/18/1995 | Winter Storm | N/A | 0 | 0 | 0 | 0 | A low pressure system moving east through the Ohio and Tennessee River Valleys brought significant ice and snow to the northern two thirds of Indiana. Freezing rain began during the evening on the 18th across central and northeast Indiana while snow fell in northwest and north central sections. The freezing rain changed to snow between 0600 and 1100 on the 19th across central and northeast sections. Total snowfall amounts of four to eight inches were common across central and northeast Indiana. Ice accumulations of a quarter to a half inch were common in east-central Indiana. The ice accumulation caused widespread power outages in central and east central Indiana leaving up to 65,000 homes without power at one point. Locations near Muncie did not have power restored until the 21st. |
| Owen | 1/2/1996 | Winter Storm | N/A | 0 | 0 | 0 | 0 | The first big snowstorm of 1996 impacted all but northwest Indiana. In central sections, snowfall amounts averaged six to twelve inches. Twenty four counties declared snow emergencies. |
| Owen | 1/6/1996 | Winter Storm | N/A | 0 | 0 | 0 | 0 | A major winter storm produced one to ten inches of snow across central and southern Indiana. Five to ten inch snows were concentrated in south central Indiana from Bloomington east to Greensburg. Strong winds also caused three to ten foot drifts leaving many roads impassable. Snow emergencies were declared in 41 counties. |
| Owen | 1/18/1996 | High Wind | 60 kts. | 0 | 0 | 22K | 0 | Strong low pressure system produced sustained winds of 20 to 35 mph and frequent gusts to 40 mph. A line of showers ahead of a cold front moved east across the state producing wind gusts from 35 to 70 mph with most counties receiving 60 mph wind gusts. |
| Owen | 2/2/1996 | Extreme Cold | N/A | 0 | 0 | 0 | 0 | Bitter cold high pressure moved into the midwest on February 2nd and remained in central Indiana through the 5th. Low temperatures were between zero and 15 below zero each day. High temperatures on the 4th barely reached above zero. Moderate winds also brought dangerously cold wind chills in the 20 to 50 below zero range. |
| Owen | 2/20/1996 | Fog | N/A | 0 | 0 | 0 | 0 | None Reported |
| Owen | 3/19/1996 | Heavy Snow | N/A | 0 | 0 | 0 | 0 | Major snowfall occurred as the result of an intense low pressure system that tracked from east Kentucky into Ohio. Snow amounts of 4 to 6 inches were common in central Indiana. Snow amounts around 12 inches occurred in west central Indiana near Crawfordsville. Amounts of 12 to 18 inches occurred in south central Indiana near Bloomington. A combination of wet heavy snow and 25 to 35 mph winds resulted in numerous trees falling across central Indiana. These trees took out power lines and blocked numerous roads. Up to 200,00 were without power in central Indiana. Many roads were impassable for several days, including Interstate 74 between Indianapolis and Illinois. |
| Cunot | 4/19/1996 | Tstm Wind | 55 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 5/4/1996 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain caused many rivers and streams to rise above flood stage. Low lands and some roads were flooded. |
| Owen | 5/4/1996 | Flood | N/A | 0 | 0 | 0 | 0 | Flood levels along the White river in the Petersburg and Hazelton areas were the highest since May of 1961. Flooding affected agricultural lands as well as residents along the river. Numerous roads were closed. |
| Spencer | 5/8/1996 | Tstm Wind | 0 kts. | 0 | 0 | 3K | 0 | Numerous trees were blown down across the county. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|----------------|---------|-----|-----|-----|-----|---|
| Spencer | 8/15/1996 | Flash Flood | N/A | 0 | 0 | 0 | 0 | Nearly 4 inches of rain from a thunderstorm caused a culvert to wash out south of Spencer. Local road closed temporarily for repairs. |
| Gosport | 8/15/1996 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | Large tree and few limbs were blown down by thunderstorm winds. Few power lines and poles also brought down by falling tree and limbs. |
| Deans Hill | 8/15/1996 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 | Thunderstorm winds blew down trees and power lines near Deans Hill. A few power poles also were brought down due to the falling trees. |
| Owen | 12/16/1996 | Winter Storm | N/A | 0 | 0 | 0 | 0 | A winter storm spread snow, sleet and freezing rain across southern and central Indiana. The precipitation began as snow around daybreak in the south but changed to sleet and freezing rain by late morning. Across central Indiana the precipitation remained mainly as snow. Snow accumulations ranged from 2 to 6 inches with amounts of 3 to 4 inches most common. Though freezing rain did occur with this event it did not cause any significant power outages. |
| Owen | 1/15/1997 | Winter Storm | N/A | 0 | 0 | 0 | 0 | A winter storm in the plain states moved into Indiana on January 15th producing rain, freezing rain, sleet and snow across most parts of the state. Freezing rain did not result in widespread power outages but did lead to numerous car accidents. Snowfall amounts averaged 3 to 5 inches across the central third of Indiana with most accumulation occurring just before the precipitation ended. Bitter cold arctic air poured in behind this weather system producing wind chills to 30 below zero. Drifting and blowing snow also caused several hours of white-out conditions on the 16th. Heavy lake effect snows associated with the arctic outbreak were confined to Indiana counties near Lake Michigan. |
| Owen | 1/24/1997 | Winter Storm | N/A | 0 | 0 | 0 | 0 | None Reported |
| Owen | 2/27/1997 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rains of two to three inches on the 26th and 27th, combined with saturated soils and existing high water levels to produce widespread river flooding across the north third of Indiana again. The Wabash, Eel, Tippecanoe, and White Rivers of north and central Indiana exceeded flood stage by anywhere from 2 to 8 feet affecting agricultural bottom land and many river roads. Some evacuations were necessary along parts of these major rivers and some of their smaller tributaries. For some streams, these were the highest water levels in four years. Smaller streams fell below flood stage by March 1st while the larger rivers remained in flood for 5 to 10 days or well into March. |
| Owen | 3/1/1997 | Flood | N/A | 0 | 0 | 0 | 0 | This is a continuation of flooding from late February as a result of heavy rains and thunderstorms that occurred February 20th and 21st as well as the 26th and 27th. |
| Owen | 4/6/1997 | High Wind | 49 kts. | 0 | 0 | 0 | 0 | Strong cold front approaching from the west brought significant large scale wind to nearly all of Indiana. Scattered power outages were reported across much of the area. Numerous trees were also blown down. There were also reports of some minor structural damage in Boone and Miami Counties. |
| Owen | 7/14/1997 | Tstm Wind | 0 kts. | 0 | 0 | 1K | 0 | Thunderstorm winds blew down trees in and around Spencer. |
| Owen | 7/26/1997 | Excessive Heat | N/A | 0 | 0 | 0 | 0 | None Reported |
| Owen | 11/13/1997 | Winter Storm | N/A | 0 | 0 | 0 | 0 | Winter storm brought 4 to 6 inch snows in a 50 mile wide swath centered on Interstate 70 between Terre Haute and Indianapolis. |
| Owen | 1/10/1998 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rains of 1 to 2 inches on the 3rd and 4th, and an additional 1 to 2 inches rainfall on the 6th through the 8th of January resulted in most streams across Indiana to exceed bankfull. Most rivers exceeded flood stage by 1 to 4 feet with a few spots exceeding five feet. In nearly all cases, only low land flooding occurred along with some minor flooding and closings of some stretches of river roads. The initial flooding began in the north third of Indiana on the 6th and progressed downstate with flood stages beginning in these areas around the 10th. Flooding in most cases ended about one week later. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|-----------|----------------------|----------|-----|-----|------|-----|---|
| Owen | 3/21/1998 | Flood | N/A | 0 | 0 | 0 | 0 | Rainfall of 1 to 2 inches around the 20th combined with a relatively wet March brought the White River in central and southwest Indiana out of its banks. Flood stages in most cases were exceeded by several feet but the impact was felt mainly on river roads and bottomland areas prior to spring plantings. |
| Owen | 4/9/1998 | Flood | N/A | 0 | 0 | 0 | 0 | Several inches of rain over a large part of Indiana from the 7th through the 9th brought already high river and stream levels above bankful. Flooding occurred along the Wabash River, White River, East Fork White River, Blue River, Sugar Creek in Johnson County, Wildcat and Deer Creeks in North central Indiana, and most other rivers and streams in northern Indiana. Start and end times for each county are estimates. |
| Owen | 4/16/1998 | Flood | N/A | 0 | 0 | 60K | 0 | Widespread rainfall of 3 to 6 inches during severe thunderstorms which produced flash flooding in these counties also ended up causing longer term river flooding. Many rivers reached levels 2 to 7 feet over flood stage and remained above bankful for anywhere from one to eleven days. Some residences were impacted but this did cause widespread flooding of uncultivated agricultural lands. |
| Cataract | 5/19/1998 | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 | Thunderstorms producing heavy rain in a short period of time caused some street flooding. |
| Spencer | 5/23/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 | None Reported |
| Spencer | 5/23/1998 | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/12/1998 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rains of 3 to 7 inches occurring during severe and tornadic storms on June 11 and 12th resulted in nearly all streams and rivers in central Indiana to exceed bankfull and cause flooding. River levels reached 3 to 7 feet above flood stage in some locations causing many river roads to be closed. Crops had yet to emerge so no crop losses occurred. |
| Owen | 6/19/1998 | Flood | N/A | 0 | 0 | 0 | 0 | Widespread 2 to 4 inch rains occurring on June 18-19, June 22, and June 28-29, resulted in widespread river and stream flooding across central and southwest Indiana. In most cases, waters reached 3 to 5 feet above flood stage, temporarily falling back below flood stage a day or two before exceeding flood stage again as the next round of significant rains came. These floods impacted agricultural lands in most cases resulting in flooded and destroyed corn crops for the second year in a row. A 6 to 11 inch rain occurred in Owen County on the 28th (described earlier here) resulted in keeping the lower stretches of the White and Wabash Rivers above flood stage into early July across Sullivan, Knox and Daviess Counties. These floods will be continued in July Storm Data. Note the hours for beginning/ending times for floods are guesses...the day of beginning/ending of the floods are good. |
| Owen | 6/22/1998 | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 | None Reported |
| Owen | 6/28/1998 | Flash Flood | N/A | 0 | 0 | 4.0M | 0 | Six to 12 inch rains in about four hours between Freedom and Spencer resulted in extreme flash flooding. Flood waters washed out 9 bridges, 8 culverts, one road, and several houses. |
| Freedom | 6/28/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 | None Reported |
| Spencer | 6/28/1998 | Hail | 1.75 in. | 0 | 0 | 0 | 0 | None Reported |
| Spencer | 6/28/1998 | Tstm Wind | 0 kts. | 0 | 0 | 1K | 0 | Trees blown down. |
| Owen | 6/29/1998 | Flood | N/A | 0 | 0 | 0 | 0 | Flooding of local stream and rivers continued through the night causing no significant additional damage beyond flash flood mentioned above. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|--------------|---------|-----|-----|-------|-----|---|
| Owen | 6/29/1998 | Tstm Wind | 0 kts. | 0 | 0 | 3K | 0 | A large and powerful squall line known as a Derecho originated in Iowa the morning of the 29th, slammed through Central Illinois the afternoon of the 29th and swept across Central Indiana the evening of the 29th. This squall line produced wind gusts of 40 to nearly 80 mph across central Indiana causing damage in nearly every central Indiana County. A weak tornado briefly touched down near Brazil around 7 PM while another weak tornado briefly touched down near Edwardsport around 9 PM. These tornadoes caused minor house damage and major tree damage. Otherwise, most wind damage resulted in widespread tree and powerline damage across central Indiana, and in a handful of cases, trees fell on houses and/or cars causing additional damage. Hardest hit areas included the Indianapolis area near Plainfield where hundreds of trees were mowed down by 70 mph straightline winds. Also hard hit was the Bedford area with hundreds of trees being toppled. And the Columbus area also experienced widespread tree and powerline damage in addition to two semitractor trucks being blown off I-65. |
| Owen | 11/10/1998 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | A vigorous low pressure system developed across the northern plains lowering to 968 millibars on the morning of November 10. Meanwhile, an associated strong cold front moved west to east across central Indiana during the morning and early afternoon. Very moist and slightly unstable air was rapidly returned northward ahead of this front which allowed a severe squall-line to form and push across the state just ahead of the front. Numerous reports of downed trees were reported across most of the counties in the storm's path. The squall-line produced widespread wind gusts from 50 to 70 mph, although very little cloud-to-ground lightning was detected with the line. Gradient winds were very strong ahead of the line which aided the thunderstorm gusts. Property damage was reported in Ipton, Morgan, Hendricks, Randolph, Madison, Hancock and Jackson counties. Damage was mainly done to roofs. |
| Coal City | 12/6/1998 | Tstm Wind | 55 kts. | 0 | 0 | 10K | 0 | A fast moving squall-line marched through the state ahead of a strong cold front producing widespread thunderstorm wind damage. Some of the most notable damage occurred across Tippecanoe, Madison and Henry counties. Severe damage occurred in West Lafayette at Purdue University when University Hall received major roof damage totalling 100 thousand dollars. Wind gauges across the county reported from 72 to 77 mile an hour wind gusts as the line passed through. In Carroll county, a 35 car freight train derailed near Rockfield as the line gust front pushed through. Frankton saw roof damage as well as a barn demolished, while at Henry county just south of Mechanicsburg, a mobile home was thrown off its foundation. Several other counties saw roof damage as well as numerous trees and power lines down. |
| Owen | 1/1/1999 | Winter Storm | N/A | 0 | 0 | 0 | 0 | 1999 started off with a bang across Central Indiana as a vigorous low pressure system pivoted from the southern plains into the Ohio Valley and Lower Great Lakes producing widespread heavy snow across all but the extreme southern extent of the Indianapolis CWA. Snowfall totals from New Year's evening to the morning of January 3 ranged from around 6 inches across the extreme southern areas of the CWA to 10 plus inches north of a line from Shelbyville to just north of Terre Haute. Highway travel was made even more difficult or impossible in places as the strong pressure gradient produced significant blowing and drifting of the snow. Also, the morning and afternoon of January 2 saw the snow change over to several hours of freezing rain and/or sleet before changing back to snow later that afternoon and evening. The freezing rain and/or sleet accumulated a significant ice layer on top of the snow. On the night of January 2 into the morning of January 3, in addition to the blowing and drifting snow, an additional light coat of snow fell on top of the ice layer. Many of the counties and/or cities across Central Indiana were under snow emergencies. Numerous motorists were stranded for days especially along Interstate 65 from Lebanon northward. |
| Owen | 1/17/1999 | Flood | N/A | 0 | 0 | 0 | 0 | Flooding occurred along Mill Creek affecting mainly agricultural bottomland. Cataract crested at 13.74 feet (flood stage is 10 feet). |
| Owen | 1/21/1999 | Flood | N/A | 0 | 0 | 19.0M | 0 | Heavy rain of up to 5 inches on the 21st and 22nd combined with rapid snow melt upstream causing widespread flooding along the White River from Muncie to East Mount Carmel. Crests ranged from around a foot above flood stage along extreme eastern sections of the White to around 10 feet above flood stage across extreme western sections. Flooding along the river in Hamilton and northern Marion counties were the highest seen since December 1990 and January 1991. Many homes and streets were flooded, and a few rescues took place. The following are various crests along the river: Muncie - 9.62 feet (flood stage is 9 feet); Anderson - |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|-----------|--------------|----------|-----|-----|------|-----|--|
| | | | | | | | | 12.8 feet (flood stage is 10 feet); Noblesville - 20.42 feet (flood stage is 14 feet); Nora - 16.67 feet (flood stage is 11 feet); Ravenswood - 10.8 feet (flood stage is 6 feet); Centerton - 16.61 feet (flood stage is 12 feet); Spencer - 22.33 feet (flood stage is 14 feet); Worthington - 26.0 feet (flood stage is 18 feet); Elliston - 27.62 feet (flood stage is 18 feet); Newberry - 23.66 feet (flood stage is 13 feet); Edwardsport - 24.6 feet (flood stage is 15 feet); Petersburg 24.89 feet (flood sage is 16 feet) and Hazleton - 25.10 feet (flood stage is 16 feet) |
| Owen | 1/21/1999 | Flood | N/A | 0 | 0 | 250K | 0 | Rapid snow melt and 2 to 5 inches of rain on the 21st and 22nd led to flooding along MillCreek. The crest at Cataract was 19.42 feet (flood stage is 10 feet). |
| Owen | 2/1/1999 | Flood | N/A | 0 | 0 | 0 | 0 | Flooding continued into the first week of February across southwestern parts of the White River. In addition, 1 to 2 inches of rain fell on the the sixth of February causing additional flooding along the White River as far northeast as Centerton. Flooding of agricultural bottomland and county roads was most extensive from Elliston downstream. The following are crests and dates: Centerton: FS - 12 Feet; Crest - 13.47 Feet on February 08 Spencer: FS - 14 Feet; Crest - 18.51 Feet on February 09 Worthington: FS - 18 Feet; Crest - 23.52 Feet on February 10 Elliston: FS - 18 Feet; Crest - 24.45 Feet on February 10 Newberry: FS - 13 Feet; Crest - 19.06 Feet on February 10 Edwardsport: FS - 15 Feet; Crest - 21.10 Feet on February 11 Petersburg: FS - 16 Feet; Crest - 22.15 Feet on February 13 Hazleton: FS - 16 Feet; Crest - 22.30 Feet on February 14 |
| Owen | 2/7/1999 | Flood | N/A | 0 | 0 | 0 | 0 | Minor flooding occurred along Mill Creek at Cataract. The crest was 15.87 feet (flood stage is 10 feet) on February 8. |
| Owen | 2/28/1999 | Flood | N/A | 0 | 0 | 0 | 0 | Minor flooding occurred along Mill Creek at Cataract. The crest was 11.61 feet (flood stage is 10 feet) on February 28. |
| Owen | 3/8/1999 | Winter Storm | N/A | 0 | 0 | 0 | 0 | A strong upper level low pressure system aided by a strong southerly flow and copius amounts of moisture led to a prolonged period of wintry precipitation featuring heavy snow across northern counties in the CWA and a mix of snow, freezing rain and sleet in southern zones of the CWA. Snowfall amounts ranged from 5-9 inches across the northern CWA. Roads were very slick and hazardous the entire area. Many schools were closed for the day as a result of the roads. |
| Freeman | 5/17/1999 | Hail | 1.75 in. | 0 | 0 | 0 | 0 | Numerous severe thunderstorms marched across central Indiana during the afternoon and evening. Hail was the main culprit during the afternoon hours, while damaging winds became more common during the evening as a squall line and embedded bow echo moved across. A 6 year old boy was killed near Linton in Greene county as a tree fell on him resulting in fatal head injuries. 2 other boys were injured as well as they took a glancing blow from the tree. Meanwhile, a woman was injured as a tree fell on her car in Faribanks, and another woman was injured as thunderstorm winds blew her car off the road in Putnamville. A tree fell on a house in Vincennes causing \$75,000 damage. Finally, lightning destroyed a house in Oolitic and injured a woman as debris struck her after lightning hit a circuit box. In general, wind gusts to near 70 mph across central Indiana caused numerous trees to fall across much of the CWA. |
| Gosport | 5/17/1999 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Numerous severe thunderstorms marched across central Indiana during the afternoon and evening. Hail was the main culprit during the afternoon hours, while damaging winds became more common during the evening as a squall line and embedded bow echo moved across. A 6 year old boy was killed near Linton in Greene county as a tree fell on him resulting in fatal head injuries. 2 other boys were injured as well as they took a glancing blow from the tree. Meanwhile, a woman was injured as a tree fell on her car in Faribanks, and another woman was injured as thunderstorm winds blew her car off the road in Putnamville. A tree fell on a house in Vincennes causing \$75,000 damage. Finally, lightning destroyed a house in Oolitic and injured a woman as debris struck her after lightning hit a circuit box. In general, wind gusts to near 70 mph across central Indiana caused numerous trees to fall across much of the CWA. |
| Gosport | 5/17/1999 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Numerous severe thunderstorms marched across central Indiana during the afternoon and evening. Hail was the main culprit during the afternoon hours, while damaging winds became more common during the evening as a squall line and embedded bow echo moved across. A 6 year old boy was killed near Linton in Greene county as a tree fell on him resulting in fatal head injuries. 2 other boys were injured as well as they took a |

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|--------------------|-----------|------------|---------|-----|-----|-----|-----|--|
| | | | | | | | | glancing blow from the tree. Meanwhile, a woman was injured as a tree fell on her car in Faribanks, and another woman was injured as thunderstorm winds blew her car off the road in Putnamville. A tree fell on a house in Vincennes causing \$75,000 damage. Finally, lightning destroyed a house in Oolitic and injured a woman as debris struck her after lightning hit a circuit box. In general, wind gusts to near 70 mph across central Indiana caused numerous trees to fall across much of the CWA. |
| Cunot | 5/17/1999 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Numerous severe thunderstorms marched across central Indiana during the afternoon and evening. Hail was the main culprit during the afternoon hours, while damaging winds became more common during the evening as a squall line and embedded bow echo moved across. A 6 year old boy was killed near Linton in Greene county as a tree fell on him resulting in fatal head injuries. 2 other boys were injured as well as they took a glancing blow from the tree. Meanwhile, a woman was injured as a tree fell on her car in Faribanks, and another woman was injured as thunderstorm winds blew her car off the road in Putnamville. A tree fell on a house in Vincennes causing \$75,000 damage. Finally, lightning destroyed a house in Oolitic and injured a woman as debris struck her after lightning hit a circuit box. In general, wind gusts to near 70 mph across central Indiana caused numerous trees to fall across much of the CWA. |
| Spencer | 5/17/1999 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Numerous severe thunderstorms marched across central Indiana during the afternoon and evening. Hail was the main culprit during the afternoon hours, while damaging winds became more common during the evening as a squall line and embedded bow echo moved across. A 6 year old boy was killed near Linton in Greene county as a tree fell on him resulting in fatal head injuries. 2 other boys were injured as well as they took a glancing blow from the tree. Meanwhile, a woman was injured as a tree fell on her car in Faribanks, and another woman was injured as thunderstorm winds blew her car off the road in Putnamville. A tree fell on a house in Vincennes causing \$75,000 damage. Finally, lightning destroyed a house in Oolitic and injured a woman as debris struck her after lightning hit a circuit box. In general, wind gusts to near 70 mph across central Indiana caused numerous trees to fall across much of the CWA. |
| Carp | 6/1/1999 | Tstm Wind | 55 kts. | 0 | 0 | 10K | 0 | A line of severe thunderstorms moved across central Indiana producing wind gusts to 68 mph. Numerous trees were down, while a tree fell on a mobile home in Oaktown. Barns were also destroyed in Oaktown and Carp. |
| Owen | 6/2/1999 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain allowed minor flooding along Mill Creek. The crest at Cataract was 14.10 feet (flood stage is 10 feet) on June 2. |
| Owen | 3/11/2000 | Heavy Snow | N/A | 0 | 0 | 0 | 0 | A strong low pressure system moved across the Ohio Valley and combined with plentiful moisture in the atmosphere to produce a widespread band of heavy snow across central Indiana. Snowfall totals were 6-8 inches across this area. Most of the reports were from winter weather spotters. |
| Owen | 4/9/2000 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rainfall on the 7th cause minor flooding along Mill Creek near Cataract. The creek crested at 12.46 feet (flood stage is 10 feet). County roads and agricultural bottomland was covered along the creek. |
| Spencer | 4/20/2000 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Separate lines of thunderstorms swept across central Indiana producing numerous large hail and damaging wind reports as a strong low pressure system moved across the state during the afternoon of April 20, 2000. In addition, a single thunderstorm moved across in the early morning producing golfball size hail near Pendleton. The first line of thunderstorms moved across northwestern parts of the IND CWA just before noon producing penny to golfball size hail across Tippecanoe, Carroll and Warren counties. The second line produced large hail but more notably damaging winds across the center of the IND CWA. The worst damage was near Bloomington, Terre Haute, Lebanon and Nineveh in Johnson county. Structural damage occurred across these areas. In Bloomington, 1 person was injured as three mobile homes were blown off their foundations from winds estimated up to 70 mph. A parked vehicle was damaged in downtown Bloomington, while a car was damaged as part of the sheet metal roof of the Indiana University Creative Arts building was thrown on it. 10 homes, a few businesses and 3 vehicles received significant damage in southern Johnson county from Princes Lake to Nineveh. National Weather Service survey indicated straight-line microburst damage with winds estimated to around 80 mph. Several homes received minor structural damage and a mobile home was overturned 7 miles northwest of Terre Haute, while Lebanon also saw some roof damage and a tree fell on a |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|-------------|----------|-----|-----|------|-----|---|
| | | | | | | | | car in Martinsville. Otherwise, some other central Indiana sites saw large hail and numerous trees and power lines down. |
| Owen | 6/21/2000 | Flood | N/A | 0 | 0 | 0 | 0 | Minor flooding occurred along Mill Creek. Cataract crested at 10.42 feet (flood stage is 10 feet) causing minor flooding of agricultural bottomland. |
| Quincy | 7/4/2000 | Lightning | N/A | 0 | 0 | 100K | 0 | A house was burned to the ground after getting struck by lightning. |
| Cataract | 8/6/2000 | Tstm Wind | 50 kts. | 0 | 0 | 50K | 0 | A squall line moved across central Indiana producing numerous reports of downed trees. In addition, a semi was blown off the road near Greenwood and a mobile home was blown off it's foundation near Rushville. |
| Southport | 9/20/2000 | Tstm Wind | 60 kts. | 0 | 1 | 20K | 0 | A squall line moved across Central Indiana producing numerous reports of tree damage and a couple reports of golfball size hail. A man was injured as he was thrown from his truck near Southport. His home also received some minor damage. A press box at Ellettsville High School was also destroyed in the thunderstorm gusts. Otherwise the only other damage was very sporadic and limited to small barns. |
| Owen | 10/5/2000 | Flash Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain of 2 to 5 inches caused widespread flash flooding across parts of central Indiana with numerous roads water covered especially adjacent to small streams. |
| Owen | 10/5/2000 | Flood | N/A | 0 | 0 | 0 | 0 | The greatest October flood to strike parts of the White River in southwest Indiana since 1926 occurred during the first half of October as 4 to 6 inches of rain across a large part of West Central and South Central Indiana on the evening of the 4th and the morning of the 5th. This flood mainly caused flooding of agricultural bottomland. A few roads also were water covered. Crests: Flood Stages: Near Centerton 12.7 12.0 Spencer 16.9 14.0 Worthington 22.5 18.0 Elliston 23.9 18.0 Newburry 18.1 13.0 Edwardsport 20.5 15.0 Hazleton 18.4 16.0 |
| Owen | 10/5/2000 | Flood | N/A | 0 | 0 | 0 | 0 | Rain of 4 to 6 inches of rain fell in West Central Indiana during the evening of the 4th and the morning of the 5th causing widespread small stream flooding across this area. This caused extensive flooding of agricultural bottomland across most of these creeks as well as numerous roads closed. A few recreational cabins were also flooded. Crests: Flood Stages: Big Walnut Creek at Reelsville 14.1 12.0 Busseron Creek near Carlisle 17.0 16.0 Eel River at Bowling Green 18.6 17.0 Mill Creek near Catatact 15.1 10.0 Salt Creek near Harrodsburg 25.4 25.0 Sugar Creek near Edinburgh 12.5 9.0 White Lick Creek at Mooresville 15.6 15.0 |
| Owen | 12/12/2000 | Flood | N/A | 0 | 0 | 0 | 0 | Minor flooding was reported along Mill Creek at Cataract. The creek crested at 10.81 feet (flood stage is 10 feet) on December 12 at 5 am. |
| Owen | 12/16/2000 | Flood | N/A | 0 | 0 | 0 | 0 | Minor flooding was reported along Mill Creek at Cataract. The creek crested at 10.84 feet (flood stage is 10 feet) on December 17 at 1 am. A few county roads were water covered and there was minor flooding of agricultural bottomland. |
| Owen | 1/30/2001 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain toward the end of the month caused minor flooding of agricultural bottomland along Mill Creek near Cataract. The creek crested at 10.6 feet on the 31st 0.6 feet above flood stage. |
| Owen | 2/9/2001 | Flood | N/A | 0 | 0 | 0 | 0 | Around an inch of rain on the 9th caused minor flooding along Mill Creek at Cataract. The creek crested at 11.66 feet or 1.66 feet above flood stage. |
| Owen | 2/24/2001 | Flood | N/A | 0 | 0 | 0 | 0 | Around an inch of rain caused minor flooding along Mill Creek near Cataract. The creek crested at 11.63 feet or 1.63 feet above flood stage on the 25th. |
| Gosport | 6/5/2001 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | A squall line moved across south central Indiana with numerous reports of trees down. A mobile home and barn were also damaged in Daviess County. |
| Spencer | 6/19/2001 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Separate clusters of severe thunderstorms laid a path of downed trees and power lines as well as large hail across central Indiana. Two trees fell on a 1992 Grand Am in Bloomfield totalling it. |
| Carp | 8/18/2001 | Hail | 1.25 in. | 0 | 0 | 0 | 0 | A squall line dropped southeast across Central Indiana knocking down numerous trees and producing large hail. A few supercells also formed southwest of Indianapolis producing mainly large hail. A tree fell on a car near Cloverdale, while a man was injured as a garage under construction collapsed on him in Chesterfield. The squall line was fueled by near full afternoon sunshine ahead of it and a very strong upper level low trailing a |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|-----------|----------|-----|-----|------|-----|---|
| | | | | | | | | cold front which lagged behind the squall line. Many streets were also water covered as nearly 4 inches of rain fell across many spots south of Indianapolis. |
| Spencer | 8/18/2001 | Hail | 1.75 in. | 0 | 0 | 0 | 0 | A squall line dropped southeast across Central Indiana knocking down numerous trees and producing large hail. A few supercells also formed southwest of Indianapolis producing mainly large hail. A tree fell on a car near Cloverdale, while a man was injured as a garage under construction collapsed on him in Chesterfield. The squall line was fueled by near full afternoon sunshine ahead of it and a very strong upper level low trailing a cold front which lagged behind the squall line. Many streets were also water covered as nearly 4 inches of rain fell across many spots south of Indianapolis. |
| Gosport | 8/18/2001 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | A squall line dropped southeast across Central Indiana knocking down numerous trees and producing large hail. A few supercells also formed southwest of Indianapolis producing mainly large hail. A tree fell on a car near Cloverdale, while a man was injured as a garage under construction collapsed on him in Chesterfield. The squall line was fueled by near full afternoon sunshine ahead of it and a very strong upper level low trailing a cold front which lagged behind the squall line. Many streets were also water covered as nearly 4 inches of rain fell across many spots south of Indianapolis. |
| Owen | 10/13/2001 | Flood | N/A | 0 | 0 | 0 | 0 | Periods of heavy rain starting on the 10th caused minor flooding along the downstream portion of the White River. Numerous streets were water covered and some impassible. Agricultural bottomland was also effected. Flood Stage: Crest: Date of Crest: Centerton 12.0 12.2 10/14 Spencer 14.0 16.2 10/16 Elliston 18.0 22.5 10/17 Newberry 13.0 16.0 10/18 Edwardsport 15.0 18.5 10/19 Petersburg 16.0 17.1 10/21 |
| Owen | 10/24/2001 | Flood | N/A | 0 | 0 | 0 | 0 | Minor flooding occurred along the White River at most spots from Muncie to Hazleton late in the month as another period of heavy rain fell to go along with periods of heavy rain around the middle of the month. Moderate flooding also occurred along downstream parts of the River. Water covered roads mostly in the southwestern counties, while northeastern counties mainly only saw some minor flooding of agricultural bottomland. Flood Stage: Crest: Date of Crest: Muncie 9.0 9.2 10/25 Anderson 10.0 13.3 10/25 Noblesville 14.0 15.0 10/26 Nora 11.0 11.3 10/27 Spencer 14.0 16.9 10/27 Elliston 18.0 22.8 10/27 Newberry 13.0 16.4 10/27 Edwardsport 15.0 19.3 10/28 Petersburg 16.0 20.3 10/31 Hazleton 16.0 20.2 11/01 |
| Spencer | 10/24/2001 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Several supercell thunderstorms and a squall line moved across Central Indiana during the afternoon and early evening of October 24. There were numerous reports of large hail and downed trees as well as a brief tornado touchdown near Williams. Notable damage reports included semi's blown off the highway at several locations, a mobile destroyed at Wesport and several barns destroyed and roofs blown off homes at various locations. A very strong cold front and negatively tilted trough combined with very unstable conditions and strong wind shear allowed many of the storms to develop rotating wall clouds, however only 1 brief touchdown occurred. |
| Owen | 12/15/2001 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain from the 14th through the 17th resulted in the highest river levels along the lower portion of the White since January 1999. Flooding affected extensive agricultural areas and closed numerous local and state roads. Crests: Centerton: 13.5 feet on December 18 (FS = 12 feet) Spencer: 19.1 feet on December 19 (FS = 14 feet) Elliston: 24.4 feet on December 18 (FS = 18 feet) Newberry: 18.7 feet on December 21 (FS = 13 feet) Edwardsport: 20.9 feet on December 19 (FS = 15 feet) Petersburg: 23.8 feet on December 24 (FS = 16 feet) Hazleton: 24.5 feet on December 25 (FS = 16 feet) |
| Owen | 2/1/2002 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain in late January caused flooding of the White River early in February. Flooding affected bottomland and closed several county roads. Flood Stage: Crest: Date: Muncie 9.0 9.07 02/02 Anderson 10.0 11.94 02/02 Noblesville 14.0 14.89 02/02 Centerton 12.0 12.86 02/01 Spencer 14.0 17.37 02/03 Elliston 18.0 22.85 02/04 Newberry 13.0 16.77 02/04 Edwardsport 15.0 19.20 02/05 |
| Owen | 3/30/2002 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rains near the end of the month brought flooding to portions of the White river. Most areas effected were bottomland, and a few roads were flooded. |
| Owen | 4/1/2002 | Flood | N/A | 0 | 0 | 0 | 0 | Flooding along the White River. Bottomlands and agricultural areas flooded along with a few roads. Flood Stage: Crest: Date of Crest: Spencer 14.0 15.6 04/02 Elliston 18.0 20.3 04/03 Newberry 13.0 14.28 04/01 Edwardsport 15.0 17.4 04/03 Petersburg 16.0 19.53 04/01 |
| Owen | 5/1/2002 | Flood | N/A | 0 | 0 | 250K | 0 | Flooding along the White River. Bottomlands, agricultural lands, some river cabins, and roads are flooded. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|-------------|----------|-----|-----|------|-----|--|
| | | | | | | | | Flood Stage: Crest: Date of Crest: Elliston 18.0 23.86 05/02 Newberry 13.0 18.69 05/02 Edwardsport 15.0 20.90 05/03 |
| New Hope | 5/7/2002 | Flash Flood | N/A | 0 | 0 | 25K | 0 | Thunderstorms moved across the southern half of central Indiana during the early morning hours of May 7. These storms produced heavy rain which lead to extensive flash flooding. Numerous roads were flooded and closed, including some state roads. In Clinton in Clay county, 10 to 12 blocks were evacuated due to flooding. In Morgan county, a school bus became stuck in high water and the occupants were evacuated. |
| Owen | 5/7/2002 | Flood | N/A | 0 | 0 | 50K | 0 | Flooding along White River. Agricultural and bottomlands flooded. Some residences affected. Flood Stage: Crest: Date of Crest: Centerton 1S 12.0 15.29 05/07 Spencer 14.0 20.53 05/09 |
| Owen | 5/12/2002 | Flash Flood | N/A | 0 | 0 | 50K | 0 | Thunderstorms moved across all of central Indiana during the day of May 12 and continuing into the evening. These thunderstorms produced very heavy rain, with many areas seeing more than one round of thunderstorms. The result was extensive flash flooding. Numerous roads were closed, including state roads and U.S. highways. A couple of bridges were washed out, and some culverts were destroyed. At Ball State University in Delaware county, residence halls experienced flooding. Elsewhere in Delaware county water was up to 6 feet deep at underpasses. At Vincennes in Knox county, a trailer park was evacuated resulting in 80 families being moved to a shelter. Other smaller evacuations occurred in Owen and Greene counties. |
| Owen | 5/12/2002 | Flood | N/A | 0 | 0 | 500K | 0 | Flooding along White River. Numerous county roads were closed. Agricultural, bottomlands, and some parks were flooded. In Anderson, some city streets were closed. In Noblesville, some businesses were affected, and many residences had basement flooding. Some evacuations were necessary in Morgan and Owen counties. Flood Stage: Crest: Date of Crest: Muncie 9.0 9.61 05/14 Anderson Waterworks 10.0 14.94 05/13 Noblesville 14.0 20.65 05/14 Nora 11.0 16.57 05/14 Ravenswood 6.0 10.60 05/14 Indianapolis Morris 16.0 16.63 05/14 Centerton 1S 12.0 17.06 05/14 Spencer 14.0 22.85 05/15 |
| Spencer | 6/1/2002 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees were down. |
| Devore | 6/15/2002 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Several multicellar storms marched across Central Indiana knocking down trees. |
| Spencer | 7/22/2002 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees and power lines down. |
| Spencer | 7/29/2002 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | A squall-line moved across central Indiana during the afternoon of July 29th. 3 separate bowing segments caused widespread damage with trees and power lines down across much of the area. A home in construction collapsed near Fishers, trees fell on houses in Lebanon and Muncie, and a roof was blown off of an airplane hanger at the Delaware County Airport. |
| Gosport | 9/20/2002 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees down |
| Freedom | 11/10/2002 | Hail | 1.75 in. | 0 | 0 | 0 | 0 | A squall line moved across Central Indiana during the afternoon producing numerous dime size hail reports and a few tree damage reports. |
| Freedom | 11/10/2002 | Hail | 0.75 in. | 0 | 0 | 0 | 0 | A squall line moved across Central Indiana during the afternoon producing numerous dime size hail reports and a few tree damage reports. |
| Owen | 12/24/2002 | Heavy Snow | N/A | 0 | 0 | 0 | 0 | Low pressure moved across the lower Ohio Valley on Christmas Eve and Christmas Day providing heavy snow to a large part of central Indiana. Snowfall amounts averaged 6 to 9 inches. The snow caused many automobile accidents. Indianapolis set a snow depth record for Christmas morning with 7 inches on the ground. |
| Spencer | 5/9/2003 | Hail | 1.00 in. | 0 | 0 | 0 | 0 | This nighttime event had everything from baseball size hail to a well defined hook echo with nice rotation. There was an occluded front from the western Great Lakes to the northern Plains. A warm front extended SW from the triple point across northeastern Indiana. The cold front was located southwest across central Illinois to northern Oklahoma. Across our southern most area, a nice supercell with 80 VILs moved from west to east. This supercell produced hail to the size of baseballs in Daviess County and numerous wind damage. Several garages and a couple of barns were blown down in Knox County. Across the northern sections of the forecast area, more strong to severe storms with large hail and damaging winds were found. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|-----------|-----------|----------|-----|-----|-------|-------|--|
| Owen | 5/10/2003 | Flood | N/A | 0 | 0 | 0 | 0 | Several heavy rain events from the 4th through the 14th caused extensive flooding of agricultural bottomland. Several parks and roads were also closed due to high water. The following are flood stages, crests and date of crests of various gauges along the White River: Site: FS: Crest: Date of Crest: Anderson 10.0 12.0 05/11/03 Noblesville 14.0 18.43 05/12/03 Nora 11.0 14.92 05/12/03 Centerton 12.0 15.19 05/13/03 Spencer 14.0 20.04 05/14/03 Elliston 18.0 24.40 05/15/03 Newberry 13.0 18.69 05/16/03 |
| Spencer | 5/28/2003 | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 | None Reported |
| Owen | 7/5/2003 | Flood | N/A | 0 | 0 | 41.6M | 12.0M | Numerous thunderstorm complexes marched across central Indiana from the evening of the 4th and not ending until the 11th. This caused near major flooding along the White River in Hamilton and northern Marion counties. The White River at Noblesville reached its highest level since March 1913. However, measured peak flow at Noblesville was about 30% less than the April 1964 flood. Major agricultural damage resulted along the entire length of the White River. Location: FS: Crest: Crest Date: Muncie 9.0 10.94 7/10 Anderson 10.0 15.79 7/9 Noblesville 14.0 21.85 7/10 Nora 11.0 17.78 7/11 Broad Ripple 6.0 8.98 7/11 Ravenswood 6.0 11.30 7/11 Morris St. 16.0 17.19 7/11 Centerton 12.0 16.89 7/12 Spencer 14.0 21.56 7/13 Worthington 18.0 24.50 7/13 Elliston 18.0 25.83 7/14 Newberry 13.0 20.35 7/15 Edwardsport 15.0 22.00 7/17 Petersburg 16.0 20.79 7/18 |
| Spencer | 7/9/2003 | Hail | 0.75 in. | 0 | 0 | 0 | 0 | Squall line knocked down numerous trees. The line damaged more than 400 homes in the Rosedale area of Parke county. Many roads were water covered due to heavy rain falling on very saturated grounds. |
| Spencer | 7/21/2003 | Tstm Wind | 55 kts. | 0 | 5 | 0 | 0 | Over 100 trees were toppled at McCormick Creek State Park injuring 5. On the morning of Monday, July 21, 2003, a large derecho moved across most of central Indiana. This event began around 4:00 am EST across the NWS Indianapolis Northwestern CWA and moved Southeast over the next 2 hours. Numerous Severe Thunderstorm Warnings were issued based on inbound radar velocities near 90 knots. Numerous wind damage reports to homes, business and trees were uncovered throughout the daylight hours. Over 100 trees were toppled in at McCormick State Park in Owen County injuring 5. There were also 2 brief F0 tornado touchdowns. One tornado was reported in Boone County near the northern apex of the bow. This tornado was later confirmed to be an F0 causing some property and tree damage. Another F0 was confirmed during an NWS storm survey on the south side of Lafayette. Numerous trees were snapped, and a set of bleachers were lifted to mid-field of a High School football field. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|-------|-----|-----|-----|-------|-----|--|
| Owen | 9/1/2003 | Flood | N/A | 0 | 0 | 22.0M | 0 | 8 to 10 inches of rain fell across central Indiana during the Labor Day weekend causing major flooding along parts of the White River. In fact, Indianapolis received the most rain ever for a calendar day (7.2 inches) breaking the old record set in 1895 (6.8 inches). According to a local newspaper account, nearly 3,000 residents across central Indiana applied for flood assistance and flood damage was estimated in excess of 20 million dollars. SEMA reports indicated more than 300 homes and nearly 60 businesses were flooded. Nearly 200 people were forced to evacuate their residences. The cities of Muncie and Anderson had near major flooding as the river crested at its highest level since April 1964 and June 1958 respectively. While the city proper of Muncie was protected by levees, considerable flood damage occurred in areas just outside of the city proper. Sandbagging in the city of Anderson saved more than 100 homes from flood damage. The local flood protection would have been overtopped without the sandbagging. There was extensive flooding across Hamilton County, however levels were nearly 2 feet below those of July 2003. The White River in the southern portion of Marion County came up 15 feet in just 18 hours after the rain ended. The greatest flood since January 1, 1991 on the White River in Indianapolis met the record flood on White Lick Creek near Centerton and produced the largest flood ever seen in Morgan County since March 1913. This flood raced downstream and struck Owen County on the 3rd. Consequently, Owen County had its worst flooding since January 1991. As this flood approached Greene County, the flood transformed to an extensive agricultural flood and its speed slowed. A near major flood along the Eel River in the Bowling Green area met this large flood along the White River at Worthington. The resulting flooding in Greene County exceeded the July 2003 flood by 2.5 feet. This was the biggest flood in Greene County since May 2002. Location: Flood Stage: Crest: Date of Crest: Muncie 9.0 14.02 09/02/03 Anderson 10.0 19.52 09/03/03 Noblesville 14.0 19.99 09/04/03 Nora 11.0 15.35 09/04/03 Ravenswood 6.0 9.5 09/04/03 Indianapolis 16.0 19.65 09/01/03 Centerton 12.0 19.87 09/02/03 Spencer 14.0 23.30 09/04/03 Worthington 18.0 26.64 09/05/03 Elliston 18.0 28.10 09/06/03 Newberry 13.0 22.93 09/06/03 Edwardsport 15.0 23.30 09/07/03 |
| Owen | 9/1/2003 | Flood | N/A | 0 | 0 | 0 | 0 | 6 to 8 inches of rain fell over the Labor Day weekend causing flooding along Mill Creek. Cataract crested at 17.62 feet. Flood stage is 15 feet. |
| Owen | 9/1/2003 | Flood | N/A | 0 | 0 | 2.5M | 0 | Record rainfall event occurred across central Indiana starting in the evening of August 31 and continuing through the morning of September 2. The heaviest rain occurred along an axis from Vigo to Clay to Putnam to Hendricks to Marion to Hamilton to Madison, Delaware and Randolph counties. Many spots near the axis received 8 to 10 inches over the 30 hour period. This resulted in widespread flash flooding and flooding along small creeks. There were numerous evacuations from homes and rescues from vehicles. Many schools were closed. Many neighborhoods that never saw flooding before were flooded. There were also hundreds of flooded basements. The National Guard was activated to help with road closings and rescues at the request of the city of Indianapolis. The flooding continued through the early morning of September 3. |
| Owen | 12/24/2003 | Flood | N/A | 0 | 0 | 0 | 0 | 1 to 2 inches and localized areas of 3 inches of rain fell across much of the southern half of the White River Basin on the 22nd and 23rd with an additional half inch of rain falling on the 29th. This caused lowland flooding. Location: FS: Crest: Date of Crest: Spencer 14 15.8 12/26/03 Elliston 18 21.3 12/26/03 Newberry 13 14.8 12/27/03 |
| Owen | 1/3/2004 | Flood | N/A | 0 | 0 | 0 | 0 | 2 to 5 inches of rain fell along the White River Basin from the 1st through the 5th causing the worst flood along the lower White River since May 2002. Extensive river flooding closed numerous local river roads and several state roads across south central Indiana. Location: FS: Crest: Date of Crest: Muncie 9.0 10.9 January 5 Anderson 10.0 13.6 January 6 Noblesville 14.0 17.0 January 6 Nora 11.0 13.4 January 6 Ravenswood 6.0 7.9 January 6 Centerton 12.0 16.0 January 5 Spencer 14.0 22.2 January 6 Elliston 18.0 27.3 January 7 Newberry 13.0 22.8 January 8 Edwardsport 15.0 23.5 January 9 Petersburg 16.0 25.1 January 11 Hazleton 16.0 25.9 January 12 |
| Owen | 1/4/2004 | Flood | N/A | 3 | 0 | 0 | 0 | The grounds were still rather saturated at the start of the New Year from the December heavy rain episodes when from the 1st to the 5th of January another 2-2.5 inches of rain fell across most locales north of Interstate 70 and as much as 5 inches of rain fell south of Interstate 70 (many locations recorded new daily rainfall records for January 4). This caused widespread flooding of streams and creeks especially across south central |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|-----------|---------|-----|-----|-----|------|-----|---|
| | | | | | | | | Indiana. There were also 3 fatalities all associated with people trying to drive through flooded roadways and being swept into higher water. 2 were killed in Jackson county near the Scott county line and along the Muscatatuck River. Meanwhile, a 16 year old female was killed as her car crossed high flowing water and hydroplaned upside down into a ditch filled with 4-5 feet of water. There were also numerous successful rescues of people trapped in cars in high water especially across south central Indiana. M77IW, M22IW, F16IW |
| Owen | 5/28/2004 | Flood | N/A | 0 | 0 | 0 | 0 | Several inches of rain from a series of thunderstorms from the 23rd through the 28th caused minor flooding along the lower part of the White River from southern Greene county into Knox county. Additional heavy rains over the last few days of the month caused new flooding along the White River from Centerton in Morgan county southward. These additional rains also helped prolong the flooding into June. Location: FS: Crest: Date of Crest: Centerton 12 12.84 May 31, 2004 Spencer 14 15.98 June 1, 2004 Elliston 18 20.99 June 2, 2004 Newberry 13 13.89 May 28, 2004 Edwardsport 15 17.00 May 29, 2004 Petersburg 16 20.37 May 31, 2004 Hazleton 16 20.00 June 1, 2004 |
| Freedom | 5/30/2004 | Tornado | F1 | 0 | 0 | 300K | 0 | An F1 tornado skipped along for almost 8 and a half miles from near Freedom to Spencer. A few homes received significant damage about midway along the path of the tornado. On 30 May 2004, a warm front was draped across far southern portions of Indiana in the morning, as part of an unseasonably strong cyclone centered in Minnesota. This warm front began the day nearly stationary, taking 8 hours to move from Vincennes to Bloomington, then rocketing northward as the low pressure system quickly pushed off to the northeast late, dragging a cold front through the state during the overnight hours. All the necessary ingredients for a major severe weather outbreak were falling into place. Morning upper-air observations showed very deep moisture and intense wind shear (wind change in speed and direction with respect to height) in the lower levels of the atmosphere. Fairly clear skies during the course of the day contributed to moderately strong instability across much of Indiana. Along and north of the warm front, winds backed to the east-southeast, further enhancing the wind shear. This area of enhanced shear with the deep moisture and instability pooled along it would serve as the focus for the first two rounds of severe weather in the Indianapolis County Warning Area (CWA) on May 30th. The first wave of severe weather came in the early afternoon, as individual rotating thunderstorms, or supercells, formed just south of the warm front, crossing over the boundary soon after forming and moving into the area of enhanced shear. These supercells began to show strong rotation soon after their formation, and produced several funnel reports and confirmed tornadoes near Spencer and Ellettsville. Each of these tornadoes were rated F1 on the Fujita Scale of Tornado Intensity, a rating corresponding to the partial peeling of roofs and destruction of small outbuildings. Wave number two began in the late afternoon and continued into the early evening hours. Additional supercell development occurred further west along the warm front, in an area that had been receiving plenty of heating all day, maximizing instability in the very moist air mass. This wave of storms included a storm that produced tornadoes in Fountain and Tippecanoe counties, one of which was rated F2 near Dayton, just southeast of Lafayette, and a long-lived supercell that tracked along and just south of the I-70 corridor, producing tornadoes in Brazil, Little Point, Monrovia, just south of Plainfield, Camby, and Indianapolis. Power flashes from the Camby tornado were visible from the front door of NWS Indianapolis. The strongest of these tornadoes was the Indianapolis tornado, which briefly achieved F2 strength on the southeast side near Keystone Avenue between Raymond and Troy where there was significant damage to numerous homes, a nursing home and an elementary school. 26 nursing home inhabitants were treated at local hospitals for minor injuries, and the rest were relocated as the building was inhabitable. In addition to this tornado, the Monrovia tornado was rated F1. All additional tornadoes from this particular supercell were rated F0, a rating corresponding to moderate tree damage and damage to outbuildings and signboards. There was also a lightning fatality in Veedersburg in Fountain County as a 24 year old male was struck while on a baseball field. The final wave of severe weather came in the late evening and early nighttime hours, and was mostly in the form of wind damage, although brief tornadoes did occur along the squall line that had formed near the Mississippi River and tracked eastward, accompanying the passage of the cold front, including tornadoes near Lake Monroe and Crothersville in south central Indiana, and Atlanta and Frankton in north central Indiana. The tornado near Lake Monroe was rated F1, while all additional tornadoes were rated F0. To complicate the issue, the repeated rounds of heavy rain caused flooding problems |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|-----------|-------------|----------|-----|-----|-----|-----|--|
| | | | | | | | | across much of the area, with several flash flood warnings and urban/small stream flood advisories being issued during the evening and overnight hours. Fifteen total tornadoes touched down in central Indiana on May 30th, with damage estimates approaching \$13,000,000 for central Indiana alone. In all, an additional eight tornadoes touched down in portions of Indiana that are served by neighboring NWS forecast offices, bringing the statewide total for the day to 23, four over the yearly average of 19. This places the May 30th outbreak as the second largest outbreak in state history, behind the outbreak of 2 June 1990, and ahead of the "Super Outbreak" of 3-4 April 1974. 37 tornadoes touched down statewide in the 1990 outbreak, and 21 tornadoes touched down during the Super Outbreak, which was the largest outbreak of tornadoes in recorded history, with 148 tornadoes touching down across 13 states and southern Canada, killing 351 and injuring thousands. Nationwide, several more tornadoes were reported, along with nearly 200 reports of large hail and nearly 600 reports of wind damage. Reports occurred all along the Mississippi, Ohio, and Tennessee Valleys, stretching from central Minnesota all the way to northeast Texas. |
| Owen | 6/1/2004 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain during May caused minor flooding along the lower part of the White River. Location: Flood Stage: Crest: Date of crest: Spencer 14.0 16.0 06/01/04 Elliston 18.0 21.0 06/02/04 Edwardsport 15.0 17.4 06/04/04 Petersburg 16.0 20.4 05/30/04 Hazleton 16.0 20.0 06/01/04 |
| Quincy | 6/13/2004 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Several trees reported down by thunderstorm winds. |
| Owen | 6/14/2004 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain on the 11th and 16th caused minor flooding along the lower half of the White River from Centerton to Hazleton. Mainly only agricultural bottomland was effected. Location: Flood Stage: Crest: Date of Crest: Centerton 12.0 14.9 June 17 Spencer 14.0 18.9 June 18 Elliston 18.0 22.6 June 20 Newberry 13.0 15.0 June 20 Edwardsport 15.0 18.6 June 21 Petersburg 16.0 18.2 June 23 Hazleton 16.0 18.2 June 23 |
| Carp | 7/3/2004 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Severe thunderstorms moved across central Indiana on the afternoon of 3 July 2004, bringing down trees and power lines in many areas, and producing hail to dime size in others. |
| Spencer | 7/10/2004 | Flash Flood | N/A | 0 | 0 | 0 | 0 | Old Patricksburg Road and US Highway 231 were under water. Thunderstorms containing heavy rain moved across central Indiana early in the morning on 10 July 2004, and again that evening. |
| Spencer | 7/13/2004 | Tstm Wind | 50 kts. | 0 | 0 | 10K | 0 | A very strong bow echo moved from north to south across west central and southwest Indiana on the afternoon and evening of 13 July 2004, with measured winds as high as 72 mph reported. Very widespread wind damage occurred with the bow echo, with a large amount of damage to trees, power lines, and utility poles. Some structural damage occurred as well. |
| Gosport | 7/13/2004 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | A very strong bow echo moved from north to south across west central and southwest Indiana on the afternoon and evening of 13 July 2004, with measured winds as high as 72 mph reported. Very widespread wind damage occurred with the bow echo, with a large amount of damage to trees, power lines, and utility poles. Some structural damage occurred as well. |
| Spencer | 7/22/2004 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees were downed in Spencer. Scattered severe thunderstorms moved across mainly the southern half of central Indiana during the afternoon and evening of 22 July 2004. |
| Spencer | 8/18/2004 | Hail | 0.88 in. | 0 | 0 | 0 | 0 | A round of severe thunderstorms moved across mainly southern portions of central Indiana on 18 August 2004. Wind damage and hail occurred in some areas. |
| Spencer | 8/18/2004 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Several trees and power lines were downed on county highways. A round of severe thunderstorms moved across mainly southern portions of central Indiana on 18 August 2004. Wind damage and hail occurred in some areas. |
| Freedom | 8/24/2004 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees were blown down. A few strong to severe thunderstorms with heavy rain moved through central Indiana on the evening of 24 August 2004. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|------------|-----|-----|-----|------|-----|---|
| Owen | 12/22/2004 | Heavy Snow | N/A | 0 | 3 | 3.0M | 0 | A snow storm of historic proportions affected central Indiana on 22-23 December 2004. Unusual in that the first round of heavy snow was not directly associated with the passage of a surface cyclone, but rather an area of strong forcing well ahead of the main area of low pressure, the storm nonetheless produced snow totals rivaling and exceeding those of the legendary Blizzard of January 1978 in some areas, crippling much of mainly southern portions of central Indiana, in some cases for several days. Fortunately for those affected, however, blizzard conditions were not produced thanks to winds much weaker than those accompanying the 1978 storm. The snow storm began during the very early morning hours of the 22nd, and continued through the day in south central Indiana. By that evening heavy snow of 4 to nearly 10 inches had fallen, generally south of Interstate 70. The greatest totals were in southern Indiana where approximately 10 inches had fallen. There was a sharp cutoff for this heavy snow. Much of the state north of I-70 did not see any snow. In the Indianapolis area, the Carmel and Brownsburg areas received no snow while the Greenwood area measured 4 inches. During the evening of the 22nd, the second band of snow moved in as the surface low passed to the southeast of the state, blanketing all of central and southern Indiana. Thundersnow was reported in several areas across central Indiana. Snow of 4 to more than 18 inches fell from this next storm system. Once again the heaviest snow fell in southern Indiana. This brought the accumulation in much of southern Indiana to more than 20 inches with some spots reporting more than 30 inches of total snow by the afternoon of the 23rd. Such snowfall amounts are historic not only in southern Indiana but for the entire state. Snowfall in northwestern portions of central Indiana was heavy at times, approaching 3 to 5 inches in Warren, Tippecanoe, Carroll, Clinton, Fountain, Vermillion, and Parke Counties. This epic snow storm closed I-64, I-65, I-74 and crippled I-70 in Indiana. This stranded hundreds of motorists in their vehicles for hours and some for a few days. A train derailment and collision also occurred in southern Indiana as a result of the snow. One hundred National Guardsmen were called out in some areas, especially in those areas where motorists were stranded. Two blackhawk helicopters and 47 humvees were used in searching for stranded motorists. Statewide, 200 property damage auto accidents were reported, along with 1,000 slide-offs, according to the Indianapolis Star. Several rescues were necessary. Snow drifts of up to 4 feet occurred in much of southern Indiana. Damage estimates were found in local newspaper reports. |
| Owen | 1/3/2005 | Flood | N/A | 1 | 0 | 9.0M | 0 | All of the snow cover from the historic pre-Christmas 2004 snow storm melted by New Year's Day 2005 as the dew point temperatures rose into the 50s. Lowland flooding occurred along the East Fork White River in Jackson County. The White River in southern Indiana rose to bankfull levels. This was the result of the melting snow cover. With warm air over Indiana, a storm system brought 2 to 4 inches of rain to much of central and southern Indiana from the 1st through the 3rd. Because of the saturated soil conditions, widespread local flooding occurred in central and southern Indiana. The major rivers in the state were flooding by the 4th. Another storm system quickly followed from the 4th through the 6th. This storm system tracked across southern Indiana and brought 2 to possibly 5 inches of rain to central and southern Indiana. Because much of this rain fell as freezing rain just north of Indianapolis, two very significant weather events occurred; a major ice storm and flood. Major flooding resulted along the White, East Fork White and Wabash River in southern Indiana. Flood levels that had not been seen in 40, 50 or more than 90 years occurred just south of the Indianapolis area. New record stages were set at the White River at Edwardsport and the Wabash River at Mount Carmel. The White River at Hazleton approached its record stage. Flooding in southern Indiana was much worse than the January 1991 flood. Areas affected in the January 1991 flood were affected again and more severely. These included Shelbyville, Rushville, Seymour, Wheeler Hollow, Bedford, Shoals, Spencer, Elнора, Edwardsport, Petersburg area, Hazleton, East Mount Carmel and New Harmony. Numerous state roads and local roads flooded by several feet. Many local agricultural levees were overtopped. As this flood unfolded, cold air behind this storm system shut off the rain but left several inches of snow covering central and northern Indiana on the 7th and 8th. Flooding fighting in southern Indiana occurred during rather harsh January conditions from the 7th through the 10th. Milder conditions returned on the 11th. Some of the significant events during this flood include: Columbus, a large city in southern Indiana, had only one access road to I-65 causing long traffic delays. Sandbagging efforts to save a power substation that served much of Rushville. A flood fight in Shelbyville to keep the Big Blue River from portions of the town. At least 70% of Jackson County was |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
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| | | | | | | | | <p>flooded. Evacuations occurred in Rockford, Shields and Brownstown area. A levee failed along the Eel River in the Jasonville area. Flood waters rose to within 10 inches of a power box for the Jasonville water system. Power was shut down and the town lost its water until flood levels receded. Spencer lost wastewater treatment service. This closed nearly all the restaurants in town. Flood waters were within 2 « blocks of the Owen county courthouse. Flood waters at the Columbus wastewater treatment plant reached so high that employees were evacuated. The plant was operated by the automated system for 12 hours. Personnel of the Indiana National Guard waged a major flood fight to save the Hazleton levee that protected nearly « of the town. At times the levee partially failed but was reinforced. Personnel of the Indiana National Guard sandbagged at State Road 64 to protect East Mount Carmel, Indiana. Sandbagging occurred on the Illinois side near Rochester. Potential major problems at the Edwardsport Power Plant on the White River were averted. Coal shipment to a major power plant in Gibson County was threatened by high levels on the Wabash River. The situation was monitored closely. Local Sandbagging in the Elnora area saved several homes. While major flooding was spreading throughout southern Indiana, central Indiana experienced extensive flooding on the White River from Muncie through Indianapolis and the Wabash River from Lafayette to Vincennes. Sandbagging was necessary in Anderson and Ravenswood areas. The warmer temperatures on the 11th began to melt the snow and ice that covered central and northern Indiana. An additional 1 to 4 inches of rain fell in much of central Indiana late on the 11th. This caused flash flooding in portions of Delaware, Madison, Tipton and Howard Counties. The most serious flooding was in the towns of Alexandria and Kokomo. Significant flooding occurred in Albany and Eaton. Flooding returned to the White River in central Indiana as a result of the rain on the 11th. After reaching a crest, the Wabash River from Lafayette to Vincennes began to rise again. January 12 was the warmest and one of the driest days in the New Year. Temperatures in central and southern Indiana soared into the 60s. Mild conditions were short lived. As cold air pushed through Indiana on the 13th, an additional 1 to 3 inches of rain fell in central and southern Indiana. This rain caused widespread local flooding. Major flooding developed along the White River in Hamilton and northern Marion Counties. Flood levels approached those of January 1991 in this area. Evacuations occurred in the Ravenswood area. Some homes had their power turned off because of high water levels. Major flooding developed on the Wabash River from Lafayette to Vincennes as a result of the rain on the 13th. Flood levels in the Lafayette and Covington areas reached their highest levels since July 2003. Flooding from Montezuma to near Vincennes was the highest since June 1958. As this major flood crest was moving downstream along the Wabash River, flood fighting occurred under very brutal conditions. Temperatures fell below freezing late on the 14th. Snow of 1 to 4 inches fell in much of eastern Illinois and central Indiana on the 16th. Temperatures dropped below zero on the 17th and 18th in the Hutsonville and Vincennes areas. Temperature moderated to more normal levels by 19th. Areas along the Wabash River most severely flooded included, Montezuma, Clinton, Taylorville and Riverview in Indiana and Darwin, York, and Hutsonville in Illinois. Flood waters overtopped many local agricultural levels. Flood waters affected the cemetery at Palestine, Illinois. As the Wabash River approached record levels at Hutsonville, the Island Creek levee across from the Hutsonville Power Plant failed during the late evening on the 17th. The level of the Wabash River fell 5 inches immediately in the town of Hutsonville. Daylight revealed the levee breach was 300 to 500 feet wide and covered 5,000 acres of farmland with 7 to 8 feet of flood waters. This breach damaged State Road 154 between Hutsonville and Grayville. Now a short 5 mile drive for local residents was a 70 mile one way journey. The breach of the Island Creek levee caused the Wabash River to crest immediately at Hutsonville and very soon afterwards at Riverton. The river crested at Vincennes within a day after the levee failure. Water flowing back into the river from the area protected by the Island Creek levee caused another crest at Riverton and Vincennes. This level was slightly lower than the crest after the breach. Rain on the 11th and 13th fell as the rivers were near crest in the Petersburg, Hazleton and Mount Carmel areas. The combination of rain and very cold temperatures hindered flood fighting in these areas. By the 13th the rivers crested at Petersburg, Hazleton, Mount Carmel and New Harmony. Flood waters would continue to recede for the remainder of January, although at times very slowly. The flood crest at New Harmony was the highest since January 1950. Another crest followed the major flood that had occurred along the White and East Fork White Rivers in much of southern Indiana. This crest was 2 to 3 feet lower on the White River from Centerton to</p> |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
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| | | | | | | | | Edwardsport. On the East Fork White River this crest was more than 8 feet lower in the Columbus and Bedford areas and 1 « feet lower at Seymour. These crests washed out as they approached Petersburg. The great flood of January 2005 began to wind down at all locations on the 20th. Mother Nature had thrown every type of severe winter weather at the residents in the Wabash River Valley. Upwards of 30 inches of snow and 12 inches of water had fallen during the prior 30 days. By the end of January flooding had ended everywhere in the Wabash River Valley except for lowland flooding along portions of the Wabash River. Millions of dollars in flood damage had occurred since the beginning of winter. The great flood of January 2005 was the most extensive in areal coverage for Indiana since March 1913 and possibly unprecedented. At least 4,000 homes and businesses flooded and more than 7,000 people displaced. One person died while attempting to cross the extensively flooded Wabash River in Warren County. Crests on the major rivers in central Indiana were as high as 15.5 feet above flood stage. M61VE |
| Owen | 1/3/2005 | Flood | N/A | 0 | 0 | 0 | 0 | Heavy rain of over 5 inches between 3 January and 7 January 2005, for a total of over 9 inches in the first half of the month, coupled with rapid snowmelt from the region's historic late December 2004 snowstorm, induced extensive areal flooding over all of central Indiana. Numerous county roads and state highways were closed by high water. |
| Quincy | 5/13/2005 | Hail | 1.00 in. | 0 | 0 | 0 | 0 | Severe thunderstorms moved through central Indiana during the afternoon and evening of 13 May 2005. The most serious severe weather came in the form of wind damage, with one person being injured when tree debris fell on their vehicle in Parke County. Some severe hail, mostly marginal, was reported as well. |
| Spencer | 5/19/2005 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees were blown down near Spencer. Several areas of severe thunderstorms, producing high winds, large hail, and extremely heavy rain, moved through central Indiana on 19 May 2005. Serious flooding occurred in some areas due to the extremely heavy rain. |
| Cataract | 5/19/2005 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees were downed near Cataract. Several areas of severe thunderstorms, producing high winds, large hail, and extremely heavy rain, moved through central Indiana on 19 May 2005. Serious flooding occurred in some areas due to the extremely heavy rain. |
| Arney | 6/5/2005 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Power lines and trees were blown down. A series of severe thunderstorms moved across central Indiana on the afternoon and evening of 5 June 2005. Several central Indiana residents and buildings were struck by lightning, and widespread wind damage occurred. In addition, large hail fell in several areas. |
| Spencer | 6/30/2005 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees were blown down. Severe thunderstorms moved through central Indiana on the evening of 30 June 2005. Events were fairly evenly split between large hail and damaging winds. |
| Owen | 8/30/2005 | Flood | N/A | 0 | 0 | 0 | 0 | U.S. 52 was closed by high water. Heavy rain from the remnants of devastating Hurricane Katrina fell across central Indiana on 30 August 2005. Rainfall was heavy in several locations, with the heaviest rain falling in a southwest to northeast corridor from Vincennes to Indianapolis and Muncie. Areal flooding took place in many areas in south central Indiana. By contrast, northeast portions of central Indiana received only light rainfall amounts. |
| Spencer | 8/30/2005 | Heavy Rain | N/A | 0 | 0 | 0 | 0 | 4.20 inches of rain was measured near Spencer. Heavy rain from the remnants of devastating Hurricane Katrina fell across central Indiana on 30 August 2005. Rainfall was heavy in several locations, with the heaviest rain falling in a southwest to northeast corridor from Vincennes to Indianapolis and Muncie. Areal flooding took place in many areas in south central Indiana. By contrast, northeast portions of central Indiana received only light rainfall amounts. |
| Gosport | 11/6/2005 | Hail | 0.88 in. | 0 | 0 | 0 | 0 | On a night in which tragedy was visited upon far southwestern Indiana, when the deadliest Indiana tornado in 31 years killed 23 Hoosiers, a large and damaging squall line moved through central Indiana in the early morning hours, fueled by a cold front and the unusual early November warmth. Widespread wind damage occurred throughout central Indiana, including several reports of downed trees and power lines. Billboards were reported downed by the winds in Howard County. The squall line continued into Ohio, but had weakened slightly by the time it reached the Indiana border. |
| Spencer | 11/6/2005 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Tree limbs were downed. On a night in which tragedy was visited upon far southwestern Indiana, when the deadliest Indiana tornado in 31 years killed 23 Hoosiers, a large and damaging squall line moved through central Indiana in the early morning hours, fueled by a cold front and the unusual early November warmth. |

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|--------------------|------------|------------|----------|-----|-----|------|-----|---|
| | | | | | | | | Widespread wind damage occurred throughout central Indiana, including several reports of downed trees and power lines. Billboards were reported downed by the winds in Howard County. The squall line continued into Ohio, but had weakened slightly by the time it reached the Indiana border. |
| Spencer | 11/15/2005 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | A large tree was downed near Spencer. An area of severe thunderstorms moved through central Indiana on the afternoon and evening of 15 November 2005, fueled by abnormally warm conditions which had been the rule across the region for the first half of the month. One strongly rotating supercell produced three tornadoes, two of them rated strong F3, over southern portions of central Indiana. Additional severe weather occurred with other supercells and squall line storms across central Indiana. Thanks to early warnings and heightened awareness of the severe weather threat, no one was killed by the tornadoes, and only one serious injury was reported. |
| Owen | 12/8/2005 | Heavy Snow | N/A | 0 | 0 | 0 | 0 | The first significant snowstorm of the 2005-2006 winter season struck central Indiana on the afternoon and evening of 8 December 2005, causing a minor transportation controversy in the Indianapolis area. City streets were clogged with commuters, many of whom left their places of business at the height of the storm in an attempt to avoid a snowy rush hour. This brought traffic to a virtual standstill across the city, with many citizens reporting commutes taking up to ten or more times the normal amount of time due to the gridlock. Compounding the problem were 214 accidents reported by the Marion County Sheriff's Department, 119 accidents to which the Indiana State Police responded, and many cars which were simply abandoned in the roads as they ran out of gas in the heavy traffic. Streets were snowy and slick, but traffic prevented snowplow crews from remedying the problem quickly. The 7.7 inches of snow measured at the Indianapolis International Airport made the day the sixth snowiest on record at that site. Throughout central Indiana, snowfall totals generally ranged from 4 to 8 inches, with most areas receiving 6-7 inches of snow. |
| Spencer | 3/9/2006 | Flood | N/A | 0 | 0 | 10K | 0 | A car was caught in water on State Road 46 at Rattlesnake Creek. Strong thunderstorms produced significant rainfall over central Indiana, causing sporadic areal flooding. Little property damage was reported. |
| Spencer | 3/9/2006 | Flood | N/A | 0 | 0 | 100K | 0 | Several bouts of heavy precipitation brought flooding to the White River in central and southwest Indiana. Crests were as high as nearly 12 feet above flood stage. Damage amounts are estimated. |
| Owen | 3/21/2006 | Heavy Snow | N/A | 0 | 0 | 0 | 0 | Six inches of snow fell. A low pressure system sliding to the south of central Indiana brought a snowy start to Spring 2006. Most snowfall totals were less than six inches, although some areas did approach or exceed that mark. Regardless of snowfall totals, the heaviest snow fell during the morning rush hour, significantly snarling the morning commute for many drivers. The 5.4 inches which fell at Indianapolis was the fourth largest 24 hour snow total after March 15 on record, and marked only the sixth time in the period of record that a snowfall of five inches or more occurred on or after March 15th. |
| Cunot | 3/31/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 | Severe thunderstorms which formed over northwest central Indiana quickly transitioned to a powerful and expanding squall line with embedded supercells that moved southeast through central Indiana during the afternoon and evening of 31 March 2006. Two tornadoes touched down in the 9-county Indianapolis metropolitan area, one of which was on the ground for 17 miles and did an estimated 8 million dollars in damage. |
| Spencer | 4/2/2006 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees were downed. |
| Spencer | 4/2/2006 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | None Reported |
| Gosport | 4/14/2006 | Tstm Wind | 50 kts. | 0 | 0 | 2K | 0 | Trees were downed and fencing was damaged at a drive-in movie theater near Gosport. Isolated severe thunderstorms moved through southwest portions of central Indiana during the early morning hours of 14 April 2006. Minor wind damage and large hail occurred. |
| Spencer | 6/17/2006 | Tstm Wind | 50 kts. | 0 | 0 | 0 | 0 | Trees were downed. A series of damaging wind-producing severe thunderstorms moved through central Indiana on the evening of 17 June 2006. Fortunately, damage was mostly confined to downed trees and power lines. |
| Spencer | 6/19/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 | The third severe weather event in as many days for central Indiana turned out to be the most intense, as several rounds of damaging storms moved through the area. In a change from previous days, however, much |

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|--------------------|-----------|--------------|----------|-----|-----|-----|-----|---|
| | | | | | | | | of the severe weather came in the form of large hail. |
| Spencer | 6/19/2006 | Hail | 0.75 in. | 0 | 0 | 0 | 0 | The third severe weather event in as many days for central Indiana turned out to be the most intense, as several rounds of damaging storms moved through the area. In a change from previous days, however, much of the severe weather came in the form of large hail. |
| Gosport | 6/19/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 | The third severe weather event in as many days for central Indiana turned out to be the most intense, as several rounds of damaging storms moved through the area. In a change from previous days, however, much of the severe weather came in the form of large hail. |
| Gosport | 6/19/2006 | Hail | 1.75 in. | 0 | 0 | 0 | 0 | No property damage reported. The third severe weather event in as many days for central Indiana turned out to be the most intense, as several rounds of damaging storms moved through the area. In a change from previous days, however, much of the severe weather came in the form of large hail. |
| Spencer | 6/19/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 | The third severe weather event in as many days for central Indiana turned out to be the most intense, as several rounds of damaging storms moved through the area. In a change from previous days, however, much of the severe weather came in the form of large hail. |
| Spencer | 6/22/2006 | Hail | 1.00 in. | 0 | 0 | 0 | 0 | A series of severe thunderstorms pounded central Indiana on 23 June 2006, continuing a period of active weather for the area. Widespread wind damage and large hail occurred, with isolated areas of flash flooding caused by extremely heavy rain. |
| Spencer | 6/22/2006 | Heavy Rain | N/A | 0 | 0 | 0 | 0 | 3.50 inches of rain fell in approximately 30 minutes west of Spencer. A series of severe thunderstorms pounded central Indiana on 23 June 2006, continuing a period of active weather for the area. Widespread wind damage and large hail occurred, with isolated areas of flash flooding caused by extremely heavy rain. |
| Spencer | 12/1/2006 | Flood | N/A | 0 | 0 | 10K | 0K | The White River flooded in Owen County. The river crested at over 5 feet above flood stage.Heavy rain brought flooding to portions of area rivers. |
| Spencer | 1/1/2007 | Flood | N/A | 0 | 0 | 10K | 0K | The White River flooded in Owen County. The river crested at over 5 feet above flood stage.Heavy rain brought flooding to portions of area rivers. |
| Owen | 2/12/2007 | Winter Storm | N/A | 0 | 0 | 0K | 0K | A powerful winter storm moved through central Indiana on 12-14 February 2007. Extremely heavy snow and blizzard conditions crippled much of the northern half of central Indiana for as much as several days, while southern portions of the area were affected by freezing rain. The largest snow event of the season struck central Indiana on February 12th through the 14th. The snow began during the evening of February 12th, moving from the southwest to northeast across Central Indiana. The snow continued at Indianapolis for nearly 30 hours, and when it was all done, during the early morning hours of February 14th, Indianapolis had received 8.5 inches of snow. Blowing and drifting of snow became problematic during the evening of February 13th and during the early morning hours of February 14th. Snow drifts caused the most problems in the areas that received the most snow, mainly north of Interstate 70. Many county highway departments were forced to pull their crews off the roads by extremely treacherous conditions, instead opting to wait the snow and wind out before venturing back out for a lengthy and difficult cleanup process. The low pressure system that produced the storm tracked along and south of the Ohio River across Kentucky which is an ideal storm track for heavy snow in central Indiana. Snow amounts with the storm were heaviest along a Lafayette to Muncie line. Many cities along this line received over a foot of snow. The largest amount of snow was measured in Lafayette, where 17 inches was measured by meteorologists at a television station. This ranks a tie for the second largest snowfall over a three day period in Lafayette. The largest snowfall in Lafayette was 20.5 inches on December 19-20, 1929. |
| Spencer | 3/2/2007 | Flood | N/A | 0 | 0 | 10K | 0K | The White River flooded in Owen County. Crests were over 4 feet above flood stage.The White River flooded in early March. Portions of the lower White remained in flood from rain in late February. |
| Spencer | 3/16/2007 | Flood | N/A | 0 | 0 | 10K | 0K | The White River flooded in Owen County. Crests were nearly 4.5 feet above flood stage.Portions of the lower White River flooded in mid-March. |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|------------|-----------|----------|-----|-----|-----|-----|--|
| Spencer | 3/24/2007 | Flood | N/A | 0 | 0 | 10K | 0K | The White River flooded in Owen County. Crests were nearly 7 feet above flood stage. The White River flooded yet again in late March. |
| Spencer | 4/3/2007 | Hail | 0.75 in. | 0 | 0 | 0K | 0K | Severe thunderstorms moved through central Indiana on the afternoon of 3 April 2007. The storms produced mostly large hail, with isolated damaging wind. |
| Freedom | 4/3/2007 | Hail | 0.75 in. | 0 | 0 | 0K | 0K | Severe thunderstorms moved through central Indiana on the afternoon of 3 April 2007. The storms produced mostly large hail, with isolated damaging wind. |
| Southport | 4/3/2007 | Hail | 0.75 in. | 0 | 0 | 0K | 0K | Severe thunderstorms moved through central Indiana on the afternoon of 3 April 2007. The storms produced mostly large hail, with isolated damaging wind. |
| Spencer | 4/3/2007 | Hail | 1.00 in. | 0 | 0 | 0K | 0K | Severe thunderstorms moved through central Indiana on the afternoon of 3 April 2007. The storms produced mostly large hail, with isolated damaging wind. |
| Jordan | 4/3/2007 | Tstm Wind | 60 kts. | 0 | 0 | 30K | 0K | Law enforcement reported a roof off a mobile home and a barn. Severe thunderstorms moved through central Indiana on the afternoon of 3 April 2007. The storms produced mostly large hail, with isolated damaging wind. |
| Spencer | 6/27/2007 | Flood | N/A | 0 | 0 | 11K | 0K | Rainfall of 2.23 inches fell in 1 hour causing streets, including West Morgan Street and Vandalia Avenue, to flood in Spencer. Flooding also caused water damage to two businesses. Storms, some containing heavy rain, moved across central Indiana on the evening of June 27th. The main damage was caused by thunderstorm winds and flooding. |
| Spencer | 6/27/2007 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K | Trees were reported down on Pottersville Road due to damaging thunderstorm winds. Storms, some containing heavy rain, moved across central Indiana on the evening of June 27th. The main damage was caused by thunderstorm winds and flooding. |
| Devore | 10/17/2007 | Hail | 0.88 in. | 0 | 0 | 0K | 0K | Nickel size hail fell on US 231 10 miles north of Spencer, which is just west of Devore in Owen County. Isolated severe weather occurred during the early evening hours of October 17, 2007 in Owen County. The main threat from the storms was hail. |
| Spencer | 1/9/2008 | Flood | N/A | 0 | 0 | 10K | 0K | Flooding occurred along the White River in Owen County, including near Spencer, due to heavy rain and snow melt. Record to near record flooding occurred during early January in many along the Tippecanoe River. One of the locations that was severely impacted was downstream of Oakdale Dam in Carroll County. Hundreds of homes were either damaged or destroyed. Millions of dollars of damage occurred due to the flooding. Heavy summer time rains falling on saturated partially frozen winter time soils led to record flooding along the Tippecanoe and other rivers and streams in northern Indiana. All of this occurred from essentially one precipitation event during January. Significant snow of more than 6 inches fell in northern Indiana on the 1st and 2nd. Record January warmth melted all of this snow overnight on the 6th. Thunderstorms late on the 7th and early on the 8th dropped 3 to over 7 inches of rain in less than 12 hours on portions of north central Indiana. Serious local flooding resulted almost immediately as the heavy rain fell. The first wave of this heavy rain was concentrated just north and outside of the Indianapolis HSA. Because White County was one of the locations where the greatest rain fell, record flooding occurred along the Tippecanoe River downstream of Oakdale Dam by 8 am on the 8th. The U.S. Geological Survey estimated the return period of this flood at their site on the Tippecanoe downstream of Oakdale Dam may have been greater than a 500 year flood. NIPSCO's figures indicated the peak flow of over 30,000 cfs from Oakdale Dam approached their calculated 100 year flow. Numerous evacuations took place on and along the Tippecanoe River downstream of Oakdale Dam. Record flooding along the Tippecanoe River quickly dissipated as the flood approached the Wabash River. Significant flooding occurred along the Wabash River from Lafayette to Terre Haute and lowland flooding from south of Terre Haute to the Ohio River. During the day on the 8th and early of the 9th another band of heavy rain of 1?? to over 4 inches fell in the Indianapolis HSA. This rain fell in the southern and eastern portions of the state and produced significant flooding in the upper portions of the White and East Fork White Basins. This was the first winter season flood for rivers and streams in these watersheds. Rainfall of one half |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|-----------|-----------|----------|-----|-----|-----|-----|--|
| | | | | | | | | inch to one and a half inches fell in the remainder of central Indiana. Lowland flooding occurred along the White River in southwest Indiana while the White River in the Indianapolis metropolitan area only reached bankfull levels. |
| Spencer | 1/29/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K | The wind gust was measured by an amateur radio operator. A squall line moved through central Indiana during the evening hours of January 29th. Hail, damaging winds, and a tornado occurred with this storm system in central Indiana. The tornado was rated EF1 and occurred in Marion County. |
| Southport | 2/6/2008 | Flood | N/A | 0 | 0 | 15K | 0K | Flooding occurred along the White River in Owen County, including near Spencer, due to heavy rain and snow melt. Widespread flooding struck central Indiana in February. Some of the same areas heavily flooded during January were once again flooded to near record levels. February flooding was more widespread and persisted longer than flooding during January. One person was killed because he drove into a flooded road. Snowfall of up to 10 inches accumulated during the early days of February in northern Indiana and portions of east central Illinois. This snow quickly melted by the morning of the 6th as temperatures rose into the 50s on the 4th and 5th. Rain of 1 to 4 inches fell in eastern Illinois and much of Indiana on the 5th and 6th. This combination of rapid snow melt and heavy rain caused extensive flooding of streams and rivers in central Indiana. The heaviest rainfall was in the east central Illinois, northern Indiana, and eastern Indiana areas. For the second time in 30 days, flooding approached record levels along the Tippecanoe River in northern Indiana. The Wabash River approached a major flood from Lafayette to Vincennes. Flooding along this portion of the Wabash River was the highest since January 2005. Extensive flooding along the White, Eel, Muscatatuck, and East Fork White Rivers was the highest to date of the winter. Flood damage along the Tippecanoe River was limited because many residents had not been able to repair January flood damage. However, some flood damage did result to those who had begun repairs. The number of people evacuated was much less as well because many homes were uninhabitable. An agricultural levee south of Terre Haute was overtopped. A few rural families had roads to their homes blocked by flood waters. Sandbagging was necessary in the Montezuma and Clinton areas. One person was killed during the evening of the 6th in Lawrence County. He drove his vehicle into a road flooded by Indian Creek. Numerous local roads and several state highways were flooded along Indiana's major rivers. Flood lasted from a few days in many central Indiana locations to nearly four weeks along portions of the Wabash River in the Hutsonville area. |
| Spencer | 3/4/2008 | Flood | N/A | 0 | 0 | 15K | 0K | Flooding occurred along the White River in Owen County, including near Spencer, due to heavy rain and snow melt. Flooding occurred across central Indiana due to heavy rain and snow melt. A few observers in south central and southeast Indiana received more than a foot of snow and a foot of rain during March. During March the focus for the heavy rain and snow events shifted from northern Indiana to southern Indiana. Rain of one to three inches fell on the 3rd and 4th. The heaviest rain fell in southern Indiana. As the lowland flooding was beginning to subside, a large March snow storm struck portions of Indiana, Kentucky, and all of Ohio on the 7th and 8th. Snow of one to nearly fifteen inches fell in Indiana south and east of Indianapolis. There was a sharp gradient with the heaviest snow. While the Indianapolis airport measured slightly over an inch of snow, the Columbus area received over nine inches. The snow began to melt on the 9th and was completely gone by the 13th. The melting snow in southeast and south central Indiana caused a slight rise on the East Fork White River and kept the river high. |
| Spencer | 3/19/2008 | Flood | N/A | 0 | 0 | 15K | 0K | Flooding occurred along the White River in Owen County, including near Spencer, due to heavy rain. Multiple roads were closed due to high water. Flooding occurred across central Indiana due to heavy rain. Rain of five to more than eight inches fell on the 18th and 19th in much of southern Indiana near and south of U.S. Highway 50. Many areas of southern Indiana were paralyzed for two or more days as a result. Martin County declared an emergency and told drivers to stay off the roads until flood waters receded. |
| Spencer | 5/14/2008 | Flood | N/A | 0 | 0 | 5K | 5K | Flooding occurred along the White River in Owen County, including near Spencer, due to heavy rain. Frequent rainfall caused lowland flooding to return to central Indiana. This delayed the growth of some fields, while some that were already planted sustained damage. |
| Spencer | 6/4/2008 | Hail | 1.00 in. | 0 | 0 | 0K | 0K | A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |

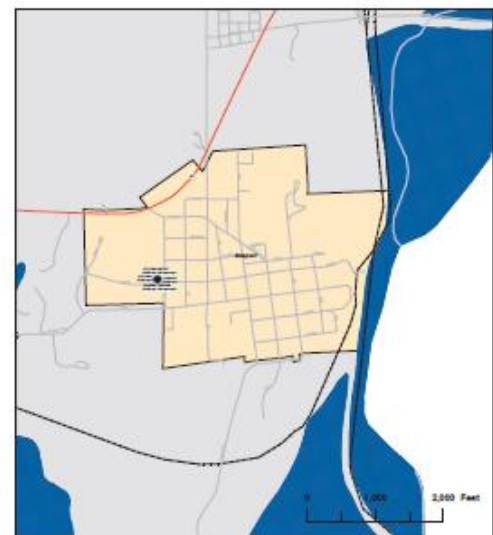
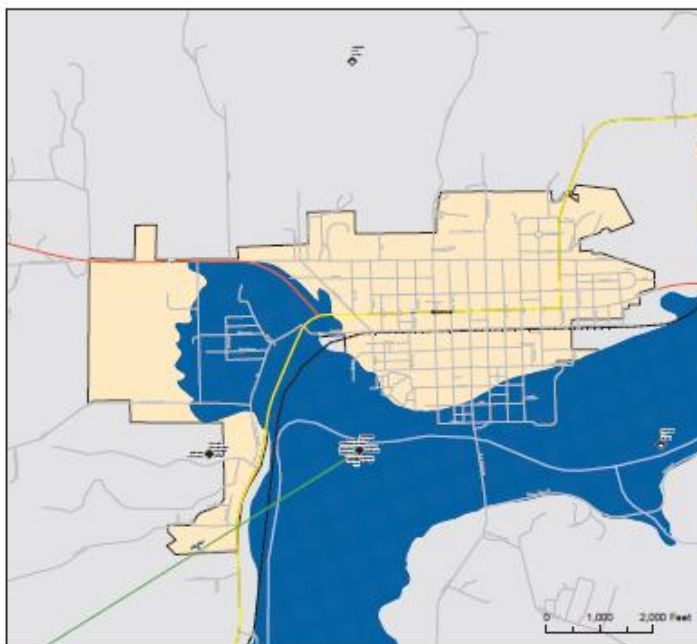
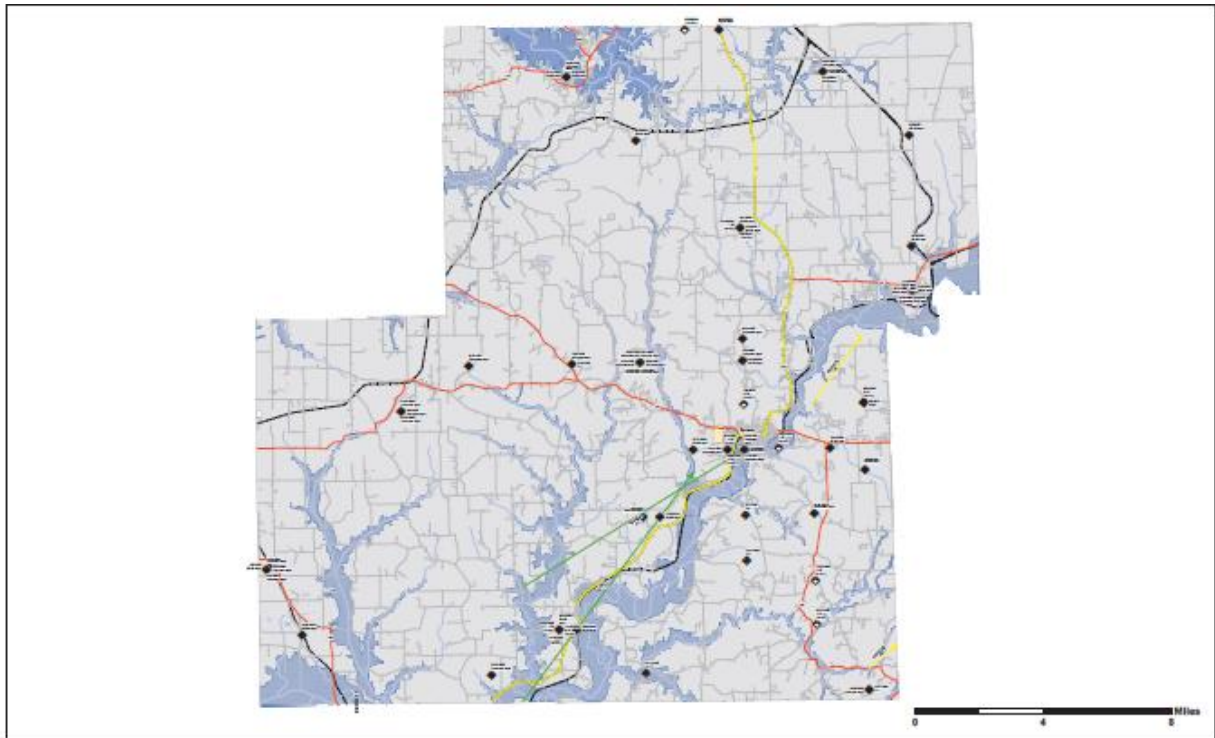
| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|----------|-------------|----------|-----|-----|-------|-------|---|
| Spencer | 6/4/2008 | Hail | 1.00 in. | 0 | 0 | 0K | 0K | A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Spencer | 6/4/2008 | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0K | Several reports of damage were received in and around Spencer. A power line fell onto a moving vehicle. The driver reportedly drove on and was not injured. A tree was down near Hidden Valley Estates. A tree fell on top of a 1997 Ford Expedition on North Montgomery Street. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Southport | 6/4/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K | A tree was down due to damaging thunderstorm winds. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Southport | 6/4/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K | Trees were reported down due to damaging thunderstorm winds. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Carp | 6/4/2008 | Tstm Wind | 56 kts. | 0 | 0 | 0K | 0K | Tree limbs were down due to damaging thunderstorm winds. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Carp | 6/4/2008 | Tstm Wind | 56 kts. | 0 | 0 | 0K | 0K | Tree limbs were down due to damaging thunderstorm winds. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Cunot | 6/4/2008 | Flash Flood | N/A | 0 | 0 | 2K | 0K | There were numerous reports of flooding in the county. Law enforcement reported nearly one foot of water over SR 67 near Freedom. A log truck became stuck in high water on Patrickburg Road just east of SR 46W. A vehicle stalled in flood water on SR 43 just south of SR 48 and the Owen-Monroe county line. A motorist was stranded on Sand Lick Road in Lafayette Township. At least a dozen county roads were closed due to high water or washouts. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Adel | 6/4/2008 | Flash Flood | N/A | 0 | 0 | 0K | 0K | Heavy rain totaling 2.49 inches within one hour caused flash flooding. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Farmers | 6/4/2008 | Flash Flood | N/A | 0 | 0 | 1K | 0K | Six inches of rain water covered SR 67. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Freedom | 6/4/2008 | Flash Flood | N/A | 0 | 0 | 0K | 0K | Traffic was reduced to one lane on SR 67 by flood waters over roadway. A strong system moved across central Indiana bringing damaging winds, large hail, and flooding. |
| Spencer | 6/4/2008 | Flood | N/A | 0 | 0 | 50.0M | 60.0M | Flooding occurred along the White River in Owen County, including near Spencer, due to heavy rain. Massive and historic flooding struck central Indiana. In Indiana alone, flood waters affected over 25,000 people. This flood affected about 9% of the state's farmland. The Great Flood of June 2008 was one of Indiana's costliest natural disasters. Heavy rainfall on May 30th allowed streams and rivers to rise. Additional heavy rainfall on the 3rd and the 4th added to these high levels. Severe weather brought heavy rainfall on the 6th as well. The stage was set for historic flooding in portions of central and southern Indiana. The storms on the 6th exacerbated the situation by laying down a boundary in southern Illinois and southern Indiana. A moist southerly low level jet rode over this boundary for more than 12 hours continually generating showers and thunderstorms. Rainfall of two to nearly eleven inches fell across portions of central and southern Indiana. The impact of the rain was immediate with widespread flooding developing and major roads and interstates flooded. This episode is in reference to flooding of the White River. |
| Freedom | 6/6/2008 | Heavy Rain | N/A | 0 | 0 | 0K | 0K | Measured rainfall of 6.80 inches was reported. Massive and historic flash flooding struck central Indiana. The Great Flood of June 2008 was one of Indiana's costliest natural disasters. Major roads and interstates flooded. Heavy rainfall on May 30th allowed streams and rivers to rise. Additional heavy rainfall on the 3rd and the 4th added to these high levels. Severe weather brought heavy rainfall on the 6th as well. The stage was set for historic flooding in portions of central and southern Indiana. The storms on the 6th exacerbated the situation by laying down a boundary in southern Illinois and southern Indiana. A moist southerly low level jet rode over this boundary for more than 12 hours continually generating showers and thunderstorms. Rainfall of two to nearly |

| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|----------|-------------|-----|-----|-----|------|-----|---|
| | | | | | | | | eleven inches fell across portions of central and southern Indiana. The impact of the rain was immediate with widespread flash flooding occurring. |
| Romona | 6/6/2008 | Heavy Rain | N/A | 0 | 0 | OK | OK | Measured rainfall of 9.18 inches was reported.Massive and historic flash flooding struck central Indiana. The Great Flood of June 2008 was one of Indiana's costliest natural disasters. Major roads and interstates flooded. Heavy rainfall on May 30th allowed streams and rivers to rise. Additional heavy rainfall on the 3rd and the 4th added to these high levels. Severe weather brought heavy rainfall on the 6th as well. The stage was set for historic flooding in portions of central and southern Indiana. The storms on the 6th exacerbated the situation by laying down a boundary in southern Illinois and southern Indiana. A moist southerly low level jet rode over this boundary for more than 12 hours continually generating showers and thunderstorms. Rainfall of two to nearly eleven inches fell across portions of central and southern Indiana. The impact of the rain was immediate with widespread flash flooding occurring. |
| Spencer | 6/6/2008 | Heavy Rain | N/A | 0 | 0 | OK | OK | Measured rainfall of 9.80 inches was reported.Massive and historic flash flooding struck central Indiana. The Great Flood of June 2008 was one of Indiana's costliest natural disasters. Major roads and interstates flooded. Heavy rainfall on May 30th allowed streams and rivers to rise. Additional heavy rainfall on the 3rd and the 4th added to these high levels. Severe weather brought heavy rainfall on the 6th as well. The stage was set for historic flooding in portions of central and southern Indiana. The storms on the 6th exacerbated the situation by laying down a boundary in southern Illinois and southern Indiana. A moist southerly low level jet rode over this boundary for more than 12 hours continually generating showers and thunderstorms. Rainfall of two to nearly eleven inches fell across portions of central and southern Indiana. The impact of the rain was immediate with widespread flash flooding occurring. |
| Spencer | 6/6/2008 | Heavy Rain | N/A | 0 | 0 | OK | OK | Measured rainfall of 7.15 inches was reported.Massive and historic flash flooding struck central Indiana. The Great Flood of June 2008 was one of Indiana's costliest natural disasters. Major roads and interstates flooded. Heavy rainfall on May 30th allowed streams and rivers to rise. Additional heavy rainfall on the 3rd and the 4th added to these high levels. Severe weather brought heavy rainfall on the 6th as well. The stage was set for historic flooding in portions of central and southern Indiana. The storms on the 6th exacerbated the situation by laying down a boundary in southern Illinois and southern Indiana. A moist southerly low level jet rode over this boundary for more than 12 hours continually generating showers and thunderstorms. Rainfall of two to nearly eleven inches fell across portions of central and southern Indiana. The impact of the rain was immediate with widespread flash flooding occurring. |
| Spencer | 6/7/2008 | Flash Flood | N/A | 0 | 0 | 10K | OK | Law enforcement reporting much of the town of Spencer under water with other areas of the county also experiencing flash flooding due to heavy rainfall.Massive and historic flash flooding struck central Indiana. The Great Flood of June 2008 was one of Indiana's costliest natural disasters. Major roads and interstates flooded. Heavy rainfall on May 30th allowed streams and rivers to rise. Additional heavy rainfall on the 3rd and the 4th added to these high levels. Severe weather brought heavy rainfall on the 6th as well. The stage was set for historic flooding in portions of central and southern Indiana. The storms on the 6th exacerbated the situation by laying down a boundary in southern Illinois and southern Indiana. A moist southerly low level jet rode over this boundary for more than 12 hours continually generating showers and thunderstorms. Rainfall of two to nearly eleven inches fell across portions of central and southern Indiana. The impact of the rain was immediate with widespread flash flooding occurring. |
| Spencer | 6/7/2008 | Flash Flood | N/A | 0 | 0 | 200K | 10K | Spencer had multiple flood damaged homes. State Roads 43, 46, and 67 were all closed. United States 231 was also closed. Roads and bridges were washed out. Water was over railroad tracks near Gosport. Cars and golf carts were under water. Over 60 roads were washed out. Campers were stranded.Massive and historic flash flooding struck central Indiana. The Great Flood of June 2008 was one of Indiana's costliest natural disasters. Major roads and interstates flooded. Heavy rainfall on May 30th allowed streams and rivers to rise. Additional heavy rainfall on the 3rd and the 4th added to these high levels. Severe weather brought heavy rainfall on the 6th as well. The stage was set for historic flooding in portions of central and southern Indiana. The storms on the 6th exacerbated the situation by laying down a boundary in southern Illinois and southern Indiana. A moist southerly low level jet rode over this boundary for more than 12 hours continually generating showers and thunderstorms. Rainfall of two to nearly eleven inches fell across portions of central and southern |

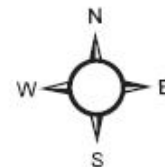
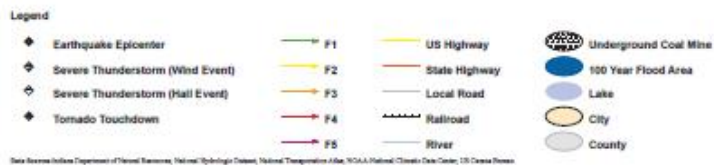
| Location or County | Date | Type | Mag | Dth | Inj | PrD | CrD | Description |
|--------------------|-----------|-------------|---------|-----|-----|-----|-----|---|
| | | | | | | | | Indiana. The impact of the rain was immediate with widespread flash flooding occurring. |
| Spencer | 6/9/2008 | Flash Flood | N/A | 0 | 0 | 5K | 0K | Water was flowing over roads in Spencer and northwest Owen County due to heavy rainfall. Severe storms produced heavy rainfall and caused flash flooding as they moved across central Indiana during the afternoon hours and through the overnight time period. |
| Spencer | 6/13/2008 | Flash Flood | N/A | 0 | 0 | 5K | 5K | Roadways were covered and previous flooding conditions were exacerbated due to heavy rainfall that caused renewed flash flooding. Thunderstorms brought flash flooding and minor wind damage to central Indiana. Lightning also injured an individual as the storms moved through. |
| Patrickburg | 6/27/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K | Severe storms moved across central Indiana during the evening hours causing damaging winds, flash flooding, and tornadoes. |
| Gosport | 6/27/2008 | Tstm Wind | 55 kts. | 0 | 0 | 0K | 0K | A tree at the corner of 7th Street and Greencastle Avenue was toppled. A large tree nearly 100 yards from the 10 O'clock Treaty Line Monument on SR 67 was uprooted. At the corner of SR 67 and Louisa Street a large tree had the majority of its branches snapped off. Severe storms moved across central Indiana during the evening hours causing damaging winds, flash flooding, and tornadoes. |
| Gosport | 6/27/2008 | Tornado | F0 | 0 | 0 | 20K | 0K | This tornado formed near Marley Road and Old Boundary Line Road in Owen County. The tornado tracked 3.02 miles to the northeast while in Owen County and passed through Gosport. The tornado moved into Morgan County while moving through an open field. The field is located 3,500 feet east of Drunkards Pike, 1,000 feet north of South Lingle Road, and 1,300 feet south of State Road 67. The tornado continued to the northeast for 1.05 miles in Morgan County before lifting 1,000 feet east of South Vickery Road between State Road 67 and South Lingle Road. This made the total path of the tornado 4.07 miles. The tornado was rated EF-0 while in both counties with wind speeds around 80 miles per hour. The tornado lasted from 1912 to 1916 EST while in Owen County and from 1916 to 1917 EST while in Morgan County. Overall, the tornado was on the ground from 1912 to 1917. The width of the tornado at its peak in both counties was approximately 175 yards. While in Owen County minor damage was sustained to trees, a gas station, a fire station, and residences. While in Morgan County trees, barns, and residences were affected by the tornado. Two young girls were caught outside on property that received the most extensive damage in Morgan County from this tornado. They received minor cuts, scrapes, and bruises from flying debris. Severe storms moved across central Indiana during the evening hours causing damaging winds, flash flooding, and tornadoes. |
| Gosport | 6/27/2008 | Tstm Wind | 50 kts. | 0 | 0 | 0K | 0K | Trees and limbs were reported down due to damaging thunderstorm winds. Severe storms moved across central Indiana during the evening hours causing damaging winds, flash flooding, and tornadoes. |
| Spencer | 7/12/2008 | Flash Flood | N/A | 0 | 0 | 0K | 0K | Flash flooding from heavy rain was reported east-southeast of Spencer. The severe weather threat increased during the mid to late afternoon hours from central Illinois to central Indiana as a result of an upper level disturbance merging with wind flow into a low over Canada, daytime heating, a moist air mass in place at the surface, and cold air aloft. As the evening progressed a weak trough developed from northwest Ohio to central Indiana, just ahead of an outflow reinforced frontal zone. A severe thunderstorm watch was issued for the area at 430 PM EST. A combination of strong winds and heavy rainfall were the threats through the mid to late evening hours. |
| Spencer | 7/13/2008 | Flood | N/A | 0 | 0 | 5K | 5K | Excessive recent rains caused flooding on the White River in Owen county, including near Spencer. July began on a dry note, but a persistent wet pattern prevailed from the 3rd through the 13th. Rain from the 3rd through the 9th kept ground conditions wetter than normal. Rainfall of 2 to nearly 6 inches on the 12th caused lowland river flooding to quickly return to portions of the White and Wabash Rivers in central Indiana. The longest dry spell since March began on the 13th and continued through the 19th. This allowed rivers to return to near normal levels and central Indiana to dry out for the first time this year. |

APPENDIX E

HAZARD MAP



Owen County Pre-Disaster Mitigation Plan Historical Natural Hazards Map



Owen County Emergency Management Agency

60 S. Main Street
County Courthouse
Spencer, IN 47460-2780

Phone: (812) 829-5935
Fax: (812) 829-8936

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APPENDIX F

COMPLETE LIST OF CRITICAL FACILITIES

Airport Facilities

| ID | Class | Name | Address | City | Contact | Use | Year Built | Cost (x\$1,000) |
|----|-------|-----------------------|---------|---------|---------|---------|------------|-----------------|
| 1 | ADFLT | SHENANDOAH FLYING FLD | AIRPORT | GOSPORT | 3II1 | Private | 1900 | \$5,614 |
| 2 | ADFLT | MILLER | AIRPORT | SPENCER | IN53 | Private | 1900 | \$5,614 |
| 3 | ADFLT | TIMBER TRAILS | AIRPORT | SPENCER | II25 | Private | 1993 | \$5,614 |

Care Facilities

| ID | Class | Name | Address | City | NumBeds | Use | Year Built | Cost (x\$1,000) |
|----|-------|-------------------------|-------------------------|---------|---------|-----------|------------|-----------------|
| 2 | EFHL | GOSPORT NURSING HOME | 27 SOUTH SEVENTH STREET | GOSPORT | 7 | Long_Term | | \$14,420 |
| 3 | EFHL | RESIDENCE AT MCCORMICK' | RR 5 BOX 82 | SPENCER | 66 | Long_Term | | \$14,420 |
| 4 | EFHL | OWEN VALLEY HEALTH CARE | RR 5 BOX 950 | SPENCER | 120 | Long_Term | | \$14,420 |
| 5 | EFMC | HOMETOWN HEALTH CARE | 9 N CRANE AVE | SPENCER | | Rural | | \$500 |
| 6 | MDFLT | Gosport Family Practice | 7 E Main | Gosport | 150 | | | \$13,520 |
| 7 | MDFLT | Owen County WIC | 911 W Hillside Ave | Spencer | 150 | Unknown | | \$500 |

Communication Facilities

| ID | Class | Name | Address | City | Contact | Use | Year Built | Cost (x\$1,000) |
|----|-------|---------------------|------------------------|--------------|--------------------|-------|------------|-----------------|
| 1 | CBR | WHCC | | ELLETTSVILLE | 286 ND LIC | FM | | \$103 |
| 2 | CBR | WHCC | | ELLETTSVILLE | 286 ND USE | FA | | \$103 |
| 3 | CBR | W262BA | | SPENCER | 262 ND CP | FX | | \$103 |
| 4 | CBR | - | | SPENCER | 249 ND RSV | FA | | \$103 |
| 5 | CBR | WCLS | | SPENCER | 224 ND LIC | FM | | \$103 |
| 6 | CBR | WCLS | | SPENCER | 224 ND USE | FA | | \$103 |
| 7 | CBR | NEW | | WHITEHALL | 210 ND APP | FM | | \$103 |
| 9 | CDFLT | <Add facility name> | 1279 FLATWOODS RD | SPENCER | <Add contact name> | Siren | | \$130 |
| 10 | CDFLT | <Add facility name> | 1279 FLATWOODS RD | SPENCER | <Add contact name> | Siren | | \$130 |
| 11 | CDFLT | <Add facility name> | 10974 US HWY 231 N | QUINCY | <Add contact name> | Siren | | \$130 |
| 12 | CDFLT | <Add facility name> | 4171 STATE FERRY RD | Bloomington | <Add contact name> | Siren | | \$130 |
| 13 | CDFLT | <Add facility name> | 5532 STATE HWY 42 | Poland | <Add contact name> | Siren | | \$130 |
| 14 | CDFLT | <Add facility name> | 5560 FREEDOM ARNEY RD | Freedom | <Add contact name> | Siren | | \$130 |
| 15 | CDFLT | <Add facility name> | 589 COOPERS COMMONS | SPENCER | <Add contact name> | Siren | | \$130 |
| 16 | CDFLT | <Add facility name> | 64 SIXTH ST GOSPORT | Gosport | <Add contact name> | Siren | | \$130 |
| 17 | CDFLT | <Add facility name> | 2650 CUNOT CATARACT RD | SPENCER | <Add contact name> | Siren | | \$130 |

| | | | | | | |
|----|-------|---------------------|-------------------------|--------------------|----------------------------|-------|
| 18 | CDFLT | <Add facility name> | 700 STATE HWY 46 WEST | SPENCER | <Add contact name> Siren | \$130 |
| 19 | CDFLT | <Add facility name> | 9823 STATE HWY 246 | Patrickburg | <Add contact name> Siren | \$130 |
| 20 | CDFLT | <Add facility name> | 14978 FOURTH ST | COAL CITY | <Add contact name> Siren | \$130 |
| 21 | CDFLT | <Add facility name> | 102 Vandalia Ave | Spencer | <Add contact name> Unknown | \$130 |
| 22 | CDFLT | <Add facility name> | <Add street address> | Spencer | <Add contact name> Cell | \$130 |
| 23 | CDFLT | <Add facility name> | 1709 Pumpkin Ridge Road | Spencer | <Add contact name> Cell | \$130 |
| 25 | CDFLT | <Add facility name> | 6401 Gentry Road | Freedom | <Add contact name> Cell | \$130 |
| 27 | CDFLT | <Add facility name> | 7979 Lehman Rd | Worthington | <Add contact name> Cell | \$130 |
| 28 | CDFLT | <Add facility name> | 3970 St Hwy 46 E | Spencer | <Add contact name> Cell | \$130 |
| 29 | CDFLT | <Add facility name> | 7201 Hardy Circle | Bowling Green | <Add contact name> Cell | \$130 |
| 30 | CDFLT | <Add facility name> | 8035 N US Hwy 231 | Spencer | <Add contact name> Cell | \$130 |
| 31 | CDFLT | <Add facility name> | 9435 Hickory Road | Spencer | <Add contact name> Cell | \$130 |
| 32 | CDFLT | <Add facility name> | Stogsdill Road | Bloomington | <Add contact name> Cell | \$130 |
| 33 | CDFLT | <Add facility name> | Hancock School Road | Spencer | <Add contact name> Cell | \$130 |
| 35 | CDFLT | <Add facility name> | Dunn Road | <Add city address> | <Add contact name> Cell | \$130 |
| 36 | CDFLT | <Add facility name> | 401 Walnut St | Spencer | <Add contact name> Comm | \$130 |
| 37 | CDFLT | <Add facility name> | 5663 ST HWY 43 | Spencer | <Add contact name> Comm | \$130 |
| 38 | CDFLT | <Add facility name> | S R 67 | Freedom | <Add contact name> Comm | \$130 |
| 39 | CDFLT | <Add facility name> | 2 N 3RD St | Gosport | <Add contact name> Comm | \$130 |
| 40 | CDFLT | <Add facility name> | 4817 Strouse Rd | Freedom | <Add contact name> Unknown | \$130 |
| 41 | CDFLT | <Add facility name> | 365 Hancock School Rd | Spencer | <Add contact name> Unknown | \$130 |
| 42 | CDFLT | <Add facility name> | Arney Area ?? | <Add city address> | <Add contact name> Cell | \$130 |

Dams

| ID | Class | Name | Near City | Distance To City | Owner | Purpose | Year Built | Normal Storage |
|----|-------|------------------------|-------------------|------------------|---------------------------|---------|------------|----------------|
| 1 | HPDE | TIMBER RIDGE LAKE DAM | SPENCER-OFFSTREAM | 4 | IND. ASSOC. OF SEVENTH DA | R | 1964 | 146 |
| 2 | HPDE | SPENCER CONS. CLUB DAM | RAMONA | 4 | SPENCER CONSERV. CLUB | R | 1978 | 47 |
| 3 | HPDE | BUCK LAKE DAM | SPENCER | 6 | DR. ROGER L. BUCK | R | 1967 | 126 |
| 4 | HPDE | DUGAN LAKE DAM | SPENCER | 5 | MICHAEL JOB | R | 1960 | 94 |
| 5 | HPDE | AMAZON LAKE DAM | ROMONA | 3 | AMAZON SHORES HOMEOWNE | R | 1975 | 399 |
| 6 | HPDE | MILLS LAKE DAM | HOFFMAN CROSSING | 2 | DOUG, GLENN, AND GREGG SH | R | 1970 | 73 |

| | | | | | | | | |
|----|------|---------------------------|--------------------|----|---------------------------|-------|------|------|
| 7 | HPDE | THOMAS LAKE DAM | FREEDOM-OFFSTREAM | 11 | A. M. THOMAS | R | 1930 | 54 |
| 8 | HPDE | GREYBROOK LAKE DAM | VANDALIA-OFFSTREAM | 5 | LAKE GREYBROOK CONSERV. A | R | 1945 | 234 |
| 9 | HPDE | RALPH KETCHUM DAM | SPENCER | 1 | RALPH KETCHUM | R | 1962 | 55 |
| 10 | HPDE | GIERHART FARM LAKE DAM | WHITACKER | 4 | BMS ENTERPRISES | R | 1968 | 73 |
| 11 | HPDE | SALTER LAKE DAM ** | WORTHINGTON | 6 | JAMES & MARIE DAVIS | R | 1973 | 137 |
| 12 | HPDE | MILLER POND DAM ** | POTTERSVILLE | 5 | HARRY C. MILLER | R | 1973 | 215 |
| 13 | HPDE | LOCUST LAKE DAM | SPENCER | 9 | LOCUST LAKE OWNERS ASSOC. | R | 1950 | 75 |
| 14 | HPDE | STROUSE'S LITTLE PINE DAM | FREEDOM-OFFSTREAM | 11 | D.L. STROUSE | R | 1930 | 70 |
| 15 | HPDE | WASATCH LAKE DAM | JORDAN | 2 | LARRY DAVIS | R | 1952 | 138 |
| 16 | HPDE | ELLISTON CREEK DAM | SPENCER | 3 | JAMES R. DULING | R | 1930 | 54 |
| 17 | HPDE | CAMP OTTO DAM | CUROT | 3 | MERIDIAN ST. UNITED METHO | R | 1935 | 46 |
| 18 | HPDE | HOLLYBROOK LAKE DAM | GOSPORT-OFFSTREAM | 2 | LAKE HOLYBROOK INC. | R | 1940 | 113 |
| 19 | HPDZ | WAGNER LAKE DAM | SPENCER | 0 | RICHARD D. WAGNER | BLANK | | 1.97 |
| 20 | HPDE | MONDS LAKE DAM ** | BOWLING GREEN | 9 | GERALD MONDS | R | 1977 | 47 |

Electric Power Facilities

| ID | Class | Name | Address | City | Contact | Use | Year Built | Cost (x\$1,000) |
|----|-------|-------------------|--------------------|---------|--------------------|------------|------------|-----------------|
| 1 | EDFLT | Carp Substation | 8661 US 231 | Quincy | <Add contact name> | Substation | | \$141,625 |
| 2 | EDFLT | Romona | 87 E Coon Path Rd | Spencer | <Add contact name> | Substation | | \$141,625 |
| 3 | EDFLT | Cunot | 9944 Owl Hollow Rd | Poland | <Add contact name> | Substation | | \$141,625 |
| 4 | EDFLT | Spencer | 721 W Hillside Ave | Spencer | <Add contact name> | Substation | | \$141,625 |
| 5 | EDFLT | Spencer | 4215 N US 231 | Spencer | <Add contact name> | Substation | | \$141,625 |
| 6 | EDFLT | Gosport | 4648 Smith Rd | Gosport | <Add contact name> | Substation | | \$141,625 |
| 7 | EDFLT | Spencer (ID #384) | 739 W Hillside Ave | Spencer | <Add contact name> | Substation | | \$141,625 |

Emergency Centers

| ID | Class | Name | Address | City | Contact | Year Built | Cost (x\$1,000) |
|----|-------|---------------------------------|-----------------|---------|--------------------|------------|-----------------|
| 1 | EDFLT | Specner EOC | 90 N West St | Spencer | <Add contact name> | | \$1,500,000 |
| 2 | EDFLT | Owen Valley Fire Department EOC | 401 W Walnut St | Spencer | <Add contact name> | | \$1,200,000 |

Fire Stations

| ID | Class | Name | Address | City | Contact | Year Built | Cost (x\$1,000) |
|----|-------|-------------------------|----------------------|--------------|------------------|------------|-----------------|
| 2 | EFFS | Owen Valley Fire Dept | 401 Walnut St | Spencer | Fire Departments | | \$1,200 |
| 4 | EFFS | Clay Township Fire CO | 5663 ST HWY 43 | Spencer | Fire Departments | | \$800 |
| 5 | EFFS | Freedom Fire Dept | S R 67 | Freedom | Fire Departments | | \$850 |
| 6 | FDFLT | Cataract Station 11 | 9582 High Ridge Trl | Spencer | Fire Departments | | \$700 |
| 7 | FDFLT | Gosport Station 19 | 2 N 3RD St | Gosport | Fire Departments | | \$900 |
| 8 | FDFLT | Patrickburg Station 7 | 10058 Marion St | Particksburg | Fire Departments | | \$773 |
| 9 | FDFLT | Coal City Station 1 | 4212 ST HWY 157 | Coal City | Fire Departments | | \$773 |
| 10 | FDFLT | W. H. M. Twp Station 18 | <Add street address> | Gosport | Fire Departments | | \$773 |

Hazmat

| ID | Class | Name | Address | City | Owner | Chemical | Year Built | Amount |
|----|-------|--------------------------------|-------------------------------|-----------|---------------|----------|------------|--------|
| 1 | HDFLT | Indiana Bell Telephone | 56 N Montgomery St | Spencer | <Add facility | Unknown | | |
| 2 | HDFLT | Ferrell Gas | 2333 St Hwy 43 | Spencer | <Add facility | Unknown | | |
| 3 | HDFLT | Bean Blossom Patrickburg Water | 790 W Franklin St | Spencer | <Add facility | Unknown | | |
| 4 | HDFLT | Bean Blossom Patrickburg Water | 439 S West St | Spencer | <Add facility | Unknown | | |
| 5 | HDFLT | Cataract Lake Water Corp | 6090 St Hwy 42 | Poland | <Add facility | Unknown | | |
| 6 | HDFLT | Stello Products | 840 W Hillside Ave | Spencer | <Add facility | Unknown | | |
| 7 | HDFLT | Boston Scientific | 780 Brookside Dr | Spencer | <Add facility | Unknown | | |
| 8 | HDFLT | Gosport Water Department | 354 E Walnut St | Gosport | <Add facility | Unknown | | |
| 9 | HDFLT | Inergy Propane Blue Flame | 3928 St Hwy 157 South | Coal City | <Add facility | Unknown | | |
| 10 | HDFLT | Co Alliance LLP Propane | 1664 St Hwy 43 | Spencer | <Add facility | Unknown | | |
| 11 | HDFLT | Co Alliance LLP Propane | 2151 Quincy Rd | Quincy | <Add facility | Unknown | | |
| 12 | HDFLT | Speedway #5556 | 719 Vandalia AV (West Morgan) | Spencer | <Add facility | Unknown | | |
| 13 | HDFLT | INDOT Spencer Site | 2201 E St Hwy 46 West | Spencer | <Add facility | Unknown | | |

Highway Bridges

| ID | Class | Name | Owner | Bridge Type | Length | Spans | Year Built | Cost (x\$1,000) |
|----|-------|-------------------|----------------------|-------------|--------|-------|------------|-----------------|
| 1 | HWB3 | BUCKHALL CREEK | State Highway Agency | 101 | 9 | 1 | 1934 | \$245 |
| 2 | HWB15 | FISH CREEK | State Highway Agency | 402 | 68 | 4 | 1924 | \$3,250 |
| 3 | HWB3 | BUSH CREEK | State Highway Agency | 119 | 9 | 1 | 1934 | \$245 |
| 4 | HWB28 | RATTLESNAKE CREEK | State Highway Agency | 111 | 32 | 2 | 1934 | \$987 |

| ID | Class | Name | Near City | Distance To City | Owner | Purpose | Year Built | Normal Storage | |
|----|-------|--------------------------|-----------|----------------------|-------|---------|------------|----------------|----------|
| 5 | HWB3 | MEADOW BROOK CREEK | | State Highway Agency | 119 | 9 | 1 | 1934 | \$245 |
| 6 | HWB3 | FALL CREEK | | State Highway Agency | 111 | 37 | 1 | 1932 | \$1,006 |
| 7 | HWB3 | MILL CREEK | | State Highway Agency | 111 | 24 | 1 | 1932 | \$653 |
| 8 | HWB3 | LIMESTONE CREEK | | State Highway Agency | 111 | 13 | 1 | 1936 | \$353 |
| 9 | HWB23 | LTL INDIAN CR & CSX RR | | State Highway Agency | 606 | 67 | 4 | 1993 | \$2,707 |
| 10 | HWB3 | INDIAN CREEK | | State Highway Agency | 111 | 12 | 1 | 1936 | \$326 |
| 11 | HWB3 | NORTH FORK JORDAN CREEK | | State Highway Agency | 102 | 10 | 1 | 1946 | \$272 |
| 12 | HWB4 | DITCH TO COON CREEK | | State Highway Agency | 119 | 7 | 1 | 2000 | \$198 |
| 13 | HWB28 | CATARACT LAKE | | State Highway Agency | 111 | 177 | 3 | 1951 | \$5,457 |
| 14 | HWB28 | DOE CREEK | | State Highway Agency | 111 | 45 | 3 | 1939 | \$1,387 |
| 15 | HWB10 | LITTLE RACCOON CREEK | | State Highway Agency | 201 | 39 | 3 | 1984 | \$1,474 |
| 16 | HWB22 | BIG RACCOON CREEK | | State Highway Agency | 602 | 30 | 3 | 1968 | \$1,139 |
| 17 | HWB15 | IND.SOUTH.RR & WHITE RIV | | State Highway Agency | 403 | 314 | 4 | 1957 | \$15,006 |
| 18 | HWB3 | BRANCH MILL CREEK | | State Highway Agency | 111 | 26 | 1 | 1932 | \$707 |
| 19 | HWB22 | MILL CREEK | | State Highway Agency | 602 | 60 | 3 | 1967 | \$2,278 |
| 20 | HWB3 | BRANCH SIX MILE CREEK | | State Highway Agency | 102 | 10 | 1 | 1933 | \$272 |
| 21 | HWB3 | SIX MILE CREEK | | State Highway Agency | 102 | 9 | 1 | 1934 | \$245 |
| 22 | HWB22 | EAST FORK FISH CREEK | | State Highway Agency | 602 | 40 | 3 | 1985 | \$1,519 |
| 23 | HWB22 | RATTLESNAKE CREEK | | State Highway Agency | 606 | 48 | 3 | 1985 | \$1,823 |
| 24 | HWB3 | MEADOWBROOK CREEK | | State Highway Agency | 111 | 9 | 1 | 1934 | \$245 |
| 25 | HWB28 | MCCORMICKS CREEK | | State Highway Agency | 111 | 22 | 2 | 1927 | \$678 |
| 26 | HWB15 | EEL RIVER | | State Highway Agency | 402 | 72 | 3 | 1963 | \$3,441 |
| 27 | HWB22 | EEL RIVER OVERFLOW | | State Highway Agency | 606 | 103 | 7 | 1963 | \$3,911 |
| 28 | HWB22 | EEL RIVER OVERFLOW | | State Highway Agency | 606 | 103 | 7 | 1963 | \$3,911 |
| 29 | HWB11 | LICK CREEK | | State Highway Agency | 201 | 31 | 3 | 1992 | \$1,245 |
| 30 | HWB26 | LICK CREEK | | State Highway Agency | 319 | 12 | 3 | 1958 | \$269 |
| 31 | HWB10 | WEST FORK FISH CREEK | | State Highway Agency | 201 | 30 | 3 | 1986 | \$1,134 |
| 32 | HWB26 | BR W FORK FISH CREEK | | State Highway Agency | 319 | 7 | 2 | 1986 | \$157 |
| 33 | HWB3 | WEST FORK FISH CREEK | | State Highway Agency | 101 | 7 | 1 | 1925 | \$190 |
| 34 | HWB10 | BR W FORK FISH CREEK | | State Highway Agency | 201 | 28 | 3 | 1986 | \$1,058 |

| ID | Class | Name | Near City | Distance To City | Owner | Purpose | Year Built | Normal Storage | |
|----|-------|--------------------------|-----------|-----------------------|-------|---------|------------|----------------|---------|
| 35 | HWB3 | MC CORMICKS CREEK | | Other State Agencies | 811 | 19 | 1 | 1934 | \$517 |
| 36 | HWB3 | MC CORMICKS CREEK | | Other State Agencies | 111 | 37 | 1 | 1969 | \$1,006 |
| 37 | HWB4 | BRANCH OF BRUSH CREEK | | County Highway Agency | 505 | 9 | 1 | 1992 | \$255 |
| 38 | HWB3 | INDIAN CREEK | | County Highway Agency | 310 | 14 | 1 | 1940 | \$381 |
| 39 | HWB12 | CSX & CONRAIL RAILROADS | | County Highway Agency | 302 | 35 | 6 | 1950 | \$1,217 |
| 40 | HWB3 | BRANCH OF INDIAN CREEK | | County Highway Agency | 111 | 14 | 1 | 1930 | \$381 |
| 41 | HWB3 | BRANCH OF BRUSH CREEK | | County Highway Agency | 111 | 10 | 1 | 1930 | \$272 |
| 42 | HWB4 | BRANCH OF MILL CREEK | | County Highway Agency | 911 | 9 | 1 | 1996 | \$255 |
| 43 | HWB26 | BRANCH OF BRUSH CREEK | | County Highway Agency | 311 | 8 | 3 | 1968 | \$179 |
| 44 | HWB17 | MILL CREEK | | County Highway Agency | 506 | 75 | 4 | 1989 | \$2,218 |
| 45 | HWB3 | BRANCH OF MILL CREEK | | County Highway Agency | 505 | 9 | 1 | 1976 | \$245 |
| 46 | HWB3 | MILL CREEK | | County Highway Agency | 310 | 59 | 1 | 1910 | \$1,604 |
| 47 | HWB3 | BRANCH OF MILL CREEK | | County Highway Agency | 111 | 12 | 1 | 1940 | \$326 |
| 48 | HWB3 | LITTLE MILL CREEK | | County Highway Agency | 302 | 9 | 1 | 1974 | \$245 |
| 49 | HWB17 | LITTLE MILL CREEK | | County Highway Agency | 505 | 26 | 3 | 1976 | \$769 |
| 50 | HWB17 | NAANS BR. OF LITTLE MILL | | County Highway Agency | 505 | 21 | 2 | 1989 | \$621 |
| 51 | HWB3 | LIMESTONE CREEK | | County Highway Agency | 102 | 11 | 1 | 1950 | \$299 |
| 52 | HWB3 | BRANCH OF MILL CREEK | | County Highway Agency | 101 | 7 | 1 | 1930 | \$190 |
| 53 | HWB3 | LIMESTONE CREEK | | County Highway Agency | 505 | 15 | 1 | 1970 | \$408 |
| 54 | HWB3 | LIMESTONE CREEK | | County Highway Agency | 103 | 8 | 1 | 1930 | \$218 |
| 55 | HWB4 | BRANCH OF BRUSH CREEK | | County Highway Agency | 911 | 9 | 1 | 1993 | \$255 |
| 56 | HWB3 | BRANCH OF BRUSH CREEK | | County Highway Agency | 103 | 8 | 1 | 1920 | \$218 |
| 57 | HWB3 | MILL CREEK | | County Highway Agency | 310 | 25 | 1 | 1920 | \$680 |
| 58 | HWB3 | LITTLE MILL CREEK | | County Highway Agency | 319 | 8 | 1 | 1970 | \$218 |
| 59 | HWB17 | JORDAN CREEK | | County Highway Agency | 502 | 29 | 3 | 1970 | \$858 |
| 60 | HWB17 | NORTH FORK JORDAN CREEK | | County Highway Agency | 505 | 21 | 3 | 1985 | \$621 |
| 61 | HWB26 | COON CREEK | | County Highway Agency | 201 | 14 | 3 | 1965 | \$314 |
| 62 | HWB4 | JORDAN CREEK | | County Highway Agency | 302 | 10 | 1 | 2002 | \$283 |
| 63 | HWB17 | JORDAN CREEK | | County Highway Agency | 505 | 22 | 3 | 1980 | \$651 |
| 64 | HWB3 | KING CREEK | | County Highway Agency | 103 | 8 | 1 | 1925 | \$218 |

| ID | Class | Name | Near City | Distance To City | Owner | Purpose | Year Built | Normal Storage | |
|----|-------|-------------------------|-----------|-----------------------|-------|---------|------------|----------------|---------|
| 65 | HWB26 | EAST FORK OF FISH CREEK | | County Highway Agency | 701 | 18 | 3 | 1988 | \$403 |
| 66 | HWB26 | EAST FORK OF FISH CREEK | | County Highway Agency | 502 | 14 | 2 | 1972 | \$314 |
| 67 | HWB3 | EAST FORK OF FISH CREEK | | County Highway Agency | 505 | 13 | 1 | 1985 | \$353 |
| 68 | HWB17 | RATTLESNAKE CREEK | | County Highway Agency | 502 | 27 | 2 | 1965 | \$798 |
| 69 | HWB17 | RATTLESNAKE CREEK | | County Highway Agency | 505 | 22 | 3 | 1986 | \$651 |
| 70 | HWB16 | WHITE RIVER | | County Highway Agency | 402 | 178 | 5 | 1995 | \$8,806 |
| 71 | HWB3 | BIG CREEK | | County Highway Agency | 505 | 12 | 1 | 1984 | \$326 |
| 72 | HWB3 | BIG CREEK | | County Highway Agency | 505 | 16 | 1 | 1970 | \$435 |
| 73 | HWB3 | MCCORMICKS CREEK | | County Highway Agency | 310 | 12 | 1 | 1930 | \$326 |
| 74 | HWB4 | BR. OF MCCORMICKS CREEK | | County Highway Agency | 911 | 6 | 1 | 2004 | \$170 |
| 75 | HWB4 | MCCORMICKS CREEK | | County Highway Agency | 302 | 18 | 1 | 1999 | \$510 |
| 76 | HWB28 | RATTLESNAKE CREEK | | County Highway Agency | 122 | 24 | 3 | 1975 | \$740 |
| 77 | HWB4 | WEST FORK OF LICK CREEK | | County Highway Agency | 302 | 12 | 1 | 2002 | \$340 |
| 78 | HWB3 | WEST FORK OF FISH CREEK | | County Highway Agency | 310 | 15 | 1 | 1930 | \$408 |
| 79 | HWB12 | EAST FORK OF FISH CREEK | | County Highway Agency | 302 | 25 | 3 | 1961 | \$869 |
| 80 | HWB3 | FISH CREEK | | County Highway Agency | 310 | 25 | 1 | 1930 | \$680 |
| 81 | HWB3 | FISH CREEK | | County Highway Agency | 505 | 14 | 1 | 1980 | \$381 |
| 82 | HWB3 | WEST FORK FISH CREEK | | County Highway Agency | 111 | 8 | 1 | 1940 | \$218 |
| 83 | HWB17 | FISH CREEK | | County Highway Agency | 505 | 39 | 3 | 1959 | \$1,153 |
| 84 | HWB3 | MACK CREEK | | County Highway Agency | 122 | 12 | 1 | 1975 | \$326 |
| 85 | HWB3 | BEECH CREEK | | County Highway Agency | 103 | 14 | 1 | 1940 | \$381 |
| 86 | HWB3 | LICK CREEK | | County Highway Agency | 505 | 19 | 1 | 1980 | \$517 |
| 87 | HWB3 | MCBRIDE BRANCH | | County Highway Agency | 505 | 9 | 1 | 1986 | \$245 |
| 88 | HWB26 | BRANCH OF WHITE RIVER | | County Highway Agency | 311 | 8 | 3 | 1970 | \$179 |
| 89 | HWB26 | BRANCH OF MILLS CREEK | | County Highway Agency | 111 | 9 | 2 | 1940 | \$202 |
| 90 | HWB4 | WHITE RIVER | | County Highway Agency | 604 | 202 | 1 | 2001 | \$5,721 |
| 91 | HWB28 | FISH CREEK | | County Highway Agency | 701 | 20 | 3 | 1989 | \$617 |
| 92 | HWB3 | SAND LICK CREEK | | County Highway Agency | 505 | 14 | 1 | 1930 | \$381 |
| 93 | HWB3 | FULK CREEK | | County Highway Agency | 101 | 7 | 1 | 1930 | \$190 |
| 94 | HWB3 | BRANCH OF BRUSH CREEK | | County Highway Agency | 310 | 15 | 1 | 1930 | \$408 |

| ID | Class | Name | Near City | Distance To City | Owner | Purpose | Year Built | Normal Storage | |
|-----|-------|-------------------------|-----------|-----------------------|-------|---------|------------|----------------|---------|
| 95 | HWB3 | BEACH CREEK | | County Highway Agency | 103 | 13 | 1 | 1950 | \$353 |
| 96 | HWB3 | LICK CREEK | | County Highway Agency | 310 | 18 | 1 | 1930 | \$489 |
| 97 | HWB3 | BRANCH OF EEL RIVER | | County Highway Agency | 111 | 9 | 1 | 1940 | \$245 |
| 98 | HWB3 | CREEK TO WHITE RIVER | | County Highway Agency | 103 | 10 | 1 | 1940 | \$272 |
| 99 | HWB4 | GOOSE CREEK | | County Highway Agency | 302 | 13 | 1 | 2002 | \$368 |
| 100 | HWB3 | SAND LICK CREEK | | County Highway Agency | 505 | 9 | 1 | 1930 | \$245 |
| 101 | HWB3 | BR. OF SAND LICK CREEK | | County Highway Agency | 505 | 9 | 1 | 1920 | \$245 |
| 102 | HWB3 | SAND LICK CREEK | | County Highway Agency | 310 | 15 | 1 | 1920 | \$408 |
| 103 | HWB3 | BRANCH OF RACCOON CREEK | | County Highway Agency | 101 | 7 | 1 | 1940 | \$190 |
| 104 | HWB17 | RACCOON CREEK | | County Highway Agency | 505 | 27 | 3 | 1976 | \$798 |
| 105 | HWB3 | BRANCH OF SIXMILE CREEK | | County Highway Agency | 103 | 8 | 1 | 1940 | \$218 |
| 106 | HWB3 | SIXMILE CREEK | | County Highway Agency | 101 | 7 | 1 | 1930 | \$190 |
| 107 | HWB26 | SULPHUR CREEK | | County Highway Agency | 505 | 17 | 3 | 1975 | \$381 |
| 108 | HWB3 | COON CREEK | | County Highway Agency | 101 | 8 | 1 | 1930 | \$218 |
| 109 | HWB3 | LICK CREEK | | County Highway Agency | 302 | 14 | 1 | 1974 | \$381 |
| 110 | HWB3 | LICK CREEK | | County Highway Agency | 505 | 14 | 1 | 1930 | \$381 |
| 111 | HWB3 | BRANCH OF LICK CREEK | | County Highway Agency | 101 | 7 | 1 | 1930 | \$190 |
| 112 | HWB3 | WEST FORK OF LICK CREEK | | County Highway Agency | 103 | 11 | 1 | 1930 | \$299 |
| 113 | HWB3 | LICK CREEK | | County Highway Agency | 122 | 21 | 1 | 1920 | \$571 |
| 114 | HWB3 | BEECH CREEK | | County Highway Agency | 310 | 15 | 1 | 1889 | \$408 |
| 115 | HWB3 | BEACH CREEK | | County Highway Agency | 505 | 15 | 1 | 1987 | \$408 |
| 116 | HWB26 | BRANCH OF BEACH CREEK | | County Highway Agency | 101 | 10 | 2 | 1930 | \$224 |
| 117 | HWB3 | FULK CREEK | | County Highway Agency | 111 | 13 | 1 | 1930 | \$353 |
| 118 | HWB26 | HAUSER CREEK | | County Highway Agency | 311 | 8 | 3 | 1970 | \$179 |
| 119 | HWB3 | BRANCH OF HAUSER CREEK | | County Highway Agency | 111 | 9 | 1 | 1930 | \$245 |
| 120 | HWB3 | MCBRIDE BRANCH | | County Highway Agency | 505 | 13 | 1 | 1940 | \$353 |
| 121 | HWB10 | RACCOON CREEK | | County Highway Agency | 201 | 32 | 3 | 1970 | \$1,210 |
| 122 | HWB3 | LICK CREEK | | County Highway Agency | 103 | 16 | 1 | 1930 | \$435 |
| 123 | HWB3 | BRANCH OF LICK CREEK | | County Highway Agency | 103 | 13 | 1 | 1930 | \$353 |
| 124 | HWB28 | RACCOON CREEK | | County Highway Agency | 122 | 23 | 2 | 1970 | \$709 |

| ID | Class | Name | Near City | Distance To City | Owner | Purpose | Year Built | Normal Storage | |
|-----|-------|------------------------|-----------|-----------------------|-------|---------|------------|----------------|---------|
| 125 | HWB4 | RACCOON CREEK | | County Highway Agency | 302 | 21 | 1 | 2003 | \$595 |
| 126 | HWB4 | RACCOON CREEK | | County Highway Agency | 302 | 18 | 1 | 2004 | \$510 |
| 127 | HWB3 | BRANCH OF HAUSER CREEK | | County Highway Agency | 702 | 11 | 1 | 1980 | \$299 |
| 128 | HWB3 | HAUSER CREEK | | County Highway Agency | 502 | 17 | 1 | 1970 | \$462 |
| 129 | HWB17 | LICK CREEK | | County Highway Agency | 505 | 22 | 3 | 1976 | \$651 |
| 130 | HWB26 | HAUSER CREEK | | County Highway Agency | 122 | 18 | 3 | 1975 | \$403 |
| 131 | HWB3 | MCBRIDE BRANCH | | County Highway Agency | 103 | 8 | 1 | 1930 | \$218 |
| 132 | HWB26 | MCBRIDE BRANCH | | County Highway Agency | 319 | 7 | 2 | 1920 | \$157 |
| 133 | HWB26 | BRUSH CREEK | | County Highway Agency | 122 | 18 | 2 | 1976 | \$403 |
| 134 | HWB26 | LICK CREEK | | County Highway Agency | 701 | 14 | 3 | 1987 | \$314 |
| 135 | HWB3 | LICK CREEK | | County Highway Agency | 302 | 9 | 1 | 1920 | \$245 |
| 136 | HWB3 | JACK CREEK | | County Highway Agency | 122 | 9 | 1 | 1935 | \$245 |
| 137 | HWB23 | CONRAIL RAILROAD | | County Highway Agency | 606 | 47 | 3 | 1993 | \$1,899 |
| 138 | HWB3 | CONRAIL RAILROAD | | County Highway Agency | 302 | 44 | 1 | 1900 | \$1,196 |
| 139 | HWB3 | SAND LICK CREEK | | County Highway Agency | 310 | 9 | 1 | 1920 | \$245 |
| 140 | HWB24 | RATTLESNAKE CREEK | | County Highway Agency | 302 | 9 | 2 | 1949 | \$196 |
| 141 | HWB3 | BRANCH OF WHITE RIVER | | County Highway Agency | 505 | 16 | 1 | 1976 | \$435 |
| 142 | HWB3 | BRANCH OF WHITE RIVER | | County Highway Agency | 105 | 9 | 1 | 1970 | \$245 |
| 143 | HWB26 | RATTLESNAKE CREEK | | County Highway Agency | 701 | 16 | 2 | 1985 | \$359 |
| 144 | HWB26 | BRUSH CREEK | | County Highway Agency | 311 | 14 | 3 | 1950 | \$314 |
| 145 | HWB3 | EEL RIVER | | County Highway Agency | 310 | 61 | 1 | 1918 | \$1,659 |
| 146 | HWB22 | MILL CREEK | | County Highway Agency | 602 | 94 | 4 | 1989 | \$3,569 |
| 147 | HWB3 | MILL CREEK | | County Highway Agency | 310 | 45 | 1 | 1910 | \$1,224 |

Natural Gas Facilities

| ID | Class | Name | Address | City | Contact | Use | Year Built | Cost (x\$1,000) |
|----|-------|-----------------------------------|------------------|--------|--------------------|---------|------------|-----------------|
| 1 | GDFLT | Midland Co-Op Propane Distributor | 2151 Quincy Road | Quincy | <Add contact name> | Unknown | | \$1,404 |

Police Stations

| ID | Class | Name | Address | City | Contact | Year Built | Cost (x\$1,000) |
|----|-------|--------------------------|------------------|---------|--------------------|------------|-----------------|
| 1 | EFPS | Owen County Sheriff Dept | 291 Vandalia Ave | Spencer | Sheriff | | \$1,442 |
| 2 | EFPS | Spencer Police Dept | 90 N West St | Spencer | Police Departments | | \$1,442 |

| | | | | | | | |
|---|-------|---------------------|-------------|---------|--------------------|--|-------|
| 3 | PDFLT | Gosport Police Dept | 13 S 3RD ST | Gosport | <Add contact name> | | \$700 |
|---|-------|---------------------|-------------|---------|--------------------|--|-------|

Potable Water Facilities

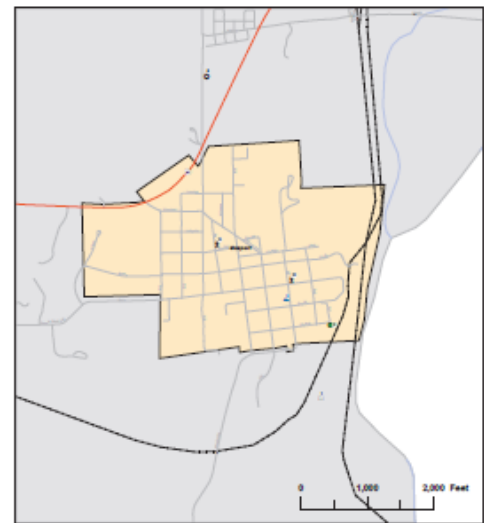
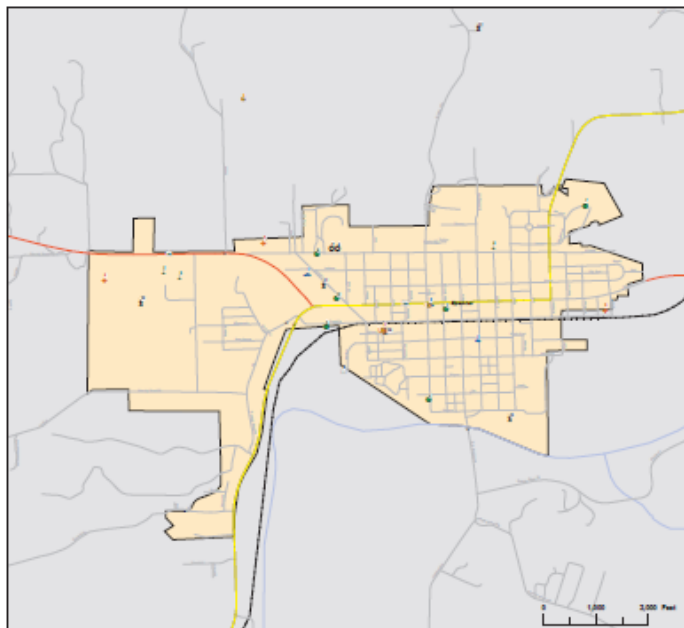
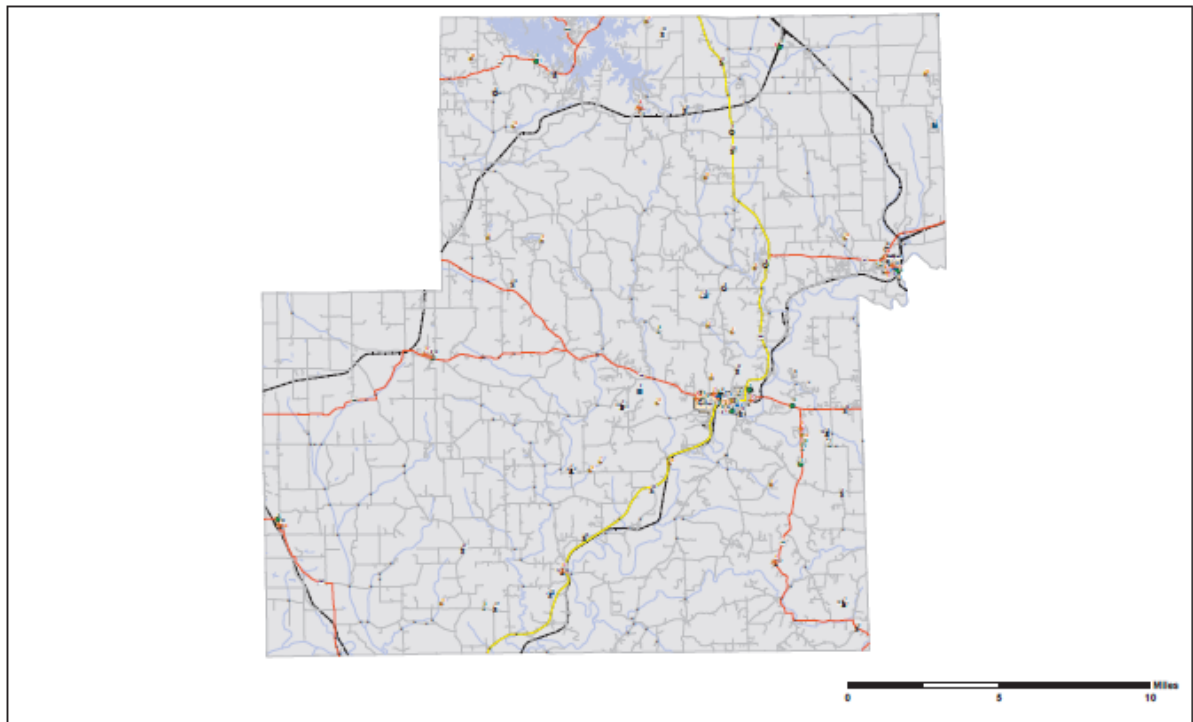
| ID | Class | Name | Address | City | Contact | Use | YearBuilt | Cost (x\$1,000) |
|----|-------|-----------------------------|----------------|---------|--------------------|---------|-----------|-----------------|
| 1 | PDFLT | Cataract LK Water | 6090 Hwy 42 | Poland | <Add contact name> | Unknown | | 42874 |
| 2 | PDFLT | Richland Bean Blossom Water | 86 E Market St | Spencer | <Add contact name> | Unknown | | 31000 |
| 3 | PDFLT | Gosport Water Company | 13 S Third St | Gosport | <Add contact name> | Unknown | | 20000 |
| 4 | PDFLT | Eastern Heights | 6436 Gentry Rd | Freedom | <Add contact name> | Unknown | | 12000 |

Schools

| ID | Class | Name | Address | City | Contact | Students | Year Built | Cost (x\$1,000) |
|----|-------|------------------------------------|-------------------------|-------------|--------------------|----------|------------|-----------------|
| 1 | EFS1 | McCormick's Creek Elem Sch | 1601 Flatwoods Rd | Spencer | Spencer-Owen | 447 | | \$1,200 |
| 2 | EFS1 | Owen Valley Middle School | 626 State Hwy 46 | Spencer | Spencer-Owen | 494 | | \$16,000 |
| 3 | EFS1 | Patrickburg Elementary Sch | 9883 State Hwy 246 | Patrickburg | Spencer-Owen | 257 | | \$6,000 |
| 4 | EFS1 | Gosport Elementary School | 201 9th St | Gosport | Spencer-Owen | 177 | | \$1,600 |
| 5 | EFS1 | Owen Valley Community HS | 622 State Hwy 46 | Spencer | Spencer-Owen | 909 | | \$17,000 |
| 6 | EFS1 | Spencer Elementary School | 151 Hillside Ave | Spencer | Spencer-Owen | 692 | | \$28,000 |
| 7 | SDFLT | Spencer Adventist Christian School | 1770 State Hwy 43 | Spencer | <Add contact name> | 9 | | \$644 |
| 8 | SDFLT | La Campagne Christian Prep Schl | 2141 Shepard Partick RD | Spencer | <Add contact name> | 300 | | \$644 |
| 9 | SDFLT | Amish School | 8199 Lehman Rd | Worthington | <Add contact name> | 38 | | \$644 |

APPENDIX G

MAP OF CRITICAL FACILITIES

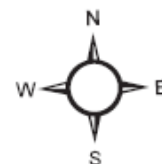


Owen County Pre-Disaster Mitigation Plan Critical Facilities Map

Legend

- | | | | | |
|------------------|--------------------------|--------------------------|-----------------|----------|
| • Care Facility | ■ Airport | • Hazardous Material | — State Highway | ○ Lake |
| • Fire Station | • Bridge | • Potable Water Facility | — Local Road | ○ City |
| • Police Station | • Communication Facility | • Wastewater Facility | — Railroad | ○ County |
| • School | • Dams | — US Highway | — River | |

Data Sources: USGS, NOAA, Indiana Department of Education, Indiana Department of Health, Indiana Department of Transportation, National Hydrologic Dataset, National Transportation Atlas, US Census Bureau



Owen County Emergency Management Agency

60 S. Main Street
County Courthouse
Spencer, IN 47460-2795

Phone: (812) 829-8935
Fax: (812) 829-8936

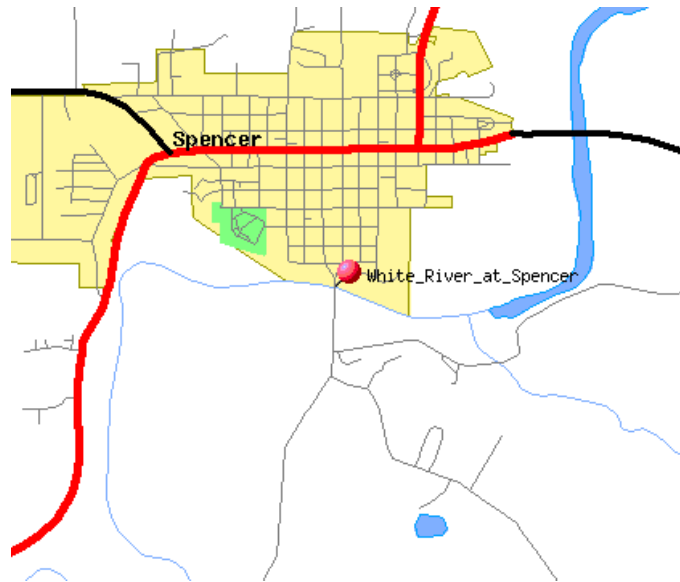
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APPENDIX H

**RECORDED NOAA FLOOD DATA:
USGS STREAM GAUGE DATA**

The following gauge information was obtained from The National Oceanic and Atmospheric Administration (NOAA) Advanced Hydrologic Prediction Service website (www.weather.gov/ahps/). For Owen County, data is provided for two points: White River at Spencer and Mill Creek near Cataract.

White River at Spencer



Flood Categories (in feet)

| | |
|-----------------------|----|
| Major Flood Stage: | 24 |
| Moderate Flood Stage: | 20 |
| Flood Stage: | 14 |
| Action Stage: | 9 |

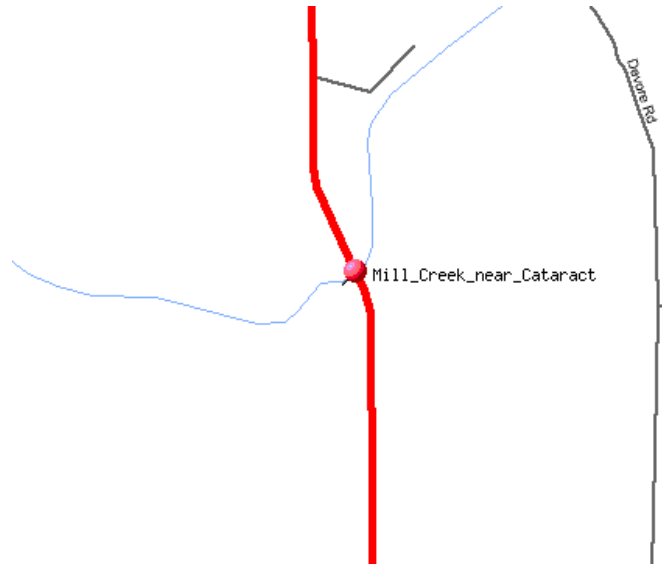
| Historical Crests |
|-----------------------------|
| (1) 28.50 ft on 03/26/1913 |
| (2) 26.93 ft on 06/08/2008 |
| (3) 25.08 ft on 01/07/2005 |
| (4) 23.95 ft on 01/01/1991 |
| (5) 23.82 ft on 11/16/1993 |
| (6) 23.33 ft on 04/23/1964 |
| (7) 23.30 ft on 09/04/2003 |
| (8) 23.20 ft on 01/16/1937 |
| (8) 23.20 ft on 05/15/1933 |
| (10) 23.09 ft on 05/25/1968 |
| (11) 23.06 ft on 05/09/1961 |
| (12) 22.96 ft on 05/20/1943 |
| (13) 22.84 ft on 01/15/2005 |
| (14) 22.22 ft on 01/06/2004 |
| (15) 22.08 ft on 01/17/2007 |
| (16) 21.68 ft on 03/21/2008 |
| (17) 21.38 ft on 03/14/2006 |

| Historical Crests |
|-----------------------------|
| (18) 21.37 ft on 02/08/2008 |
| (19) 20.03 ft on 05/14/2003 |
| (20) 19.64 ft on 02/13/2009 |

| Feet | Flood Impacts |
|------|--|
| 29.5 | Record flood is in progress. Flood waters approaching court house from the south as southside of Spencer floods. Much of Prospect Park near State Road 46 and US 231 is completely underwater. A devastating flood on the riverside of railroad tracks. |
| 29.1 | At this level the Spencer Wastewater Treatment Plant begins to flood. It may be the only dry spot in Spencer proper except for the hills. In June 2008...the lab was flooded by 2 feet of water at a level of 26.85 feet. Be sure to set new high water mark at the Court House for future reference. |
| 28.5 | Water is at record flood level. In the newer areas of southeast Spencer, flood waters surround apartments, Senior Citizens' Center and nursing home. Flood waters 2 feet deep in Fairground Building. Possible first floor flooding on Spencer's southside. |
| 28.0 | City Maintenance Garage floods by several feet. Evacuations are necessary in Southport area. Residential area near gravel pit just downstream completely floods. Extensive rural flooding just north of Freedom is in progress. |
| 26.9 | The Great June 2008 Flood damaged all homes located south of Wayne Street in Spencer as well as Williamsburg and Greenbriar Apartments. Water was around the Senior Citizens Complex...but not in any Buildings. Flood waters were up to the edge of East Market Street. In the Prospect Park area only the roof tops of homes were visible as the water covered High School Road. High School was safe during this flood...but not when the bigger flood comes. Flood waters cover the southside of Riverside Cemetery. |
| 26.8 | Flood waters approached SR 67 at the intersection of Country Club Road just north of Spencer during June 2008. Flooding damaged more than 150 homes in Spencer. |
| 26.0 | Buildings in the Owen County Fairgrounds begins to flood. Flood waters begin to enter Spencer proper. |
| 25.5 | City Maintenance Garage built in 2007 begins to flood. |
| 25.1 | The following streets in Spencer were flooded during June 2008 as the river went above 25 feet...Lincoln...Vandalia...West Hill...Beam...and West Franklin. |
| 24.6 | North South road located on east side of Owen Valley Middle and High Schools begins to flood. |
| 24.3 | Prospect Park on Spencer's westside extensively floods. Streets that partially flood on the southside include Cooper Street, West, Montgomery, Main, Washington, Harrison, East and Clay. Sandbagging is necessary on the southside of Spencer. |
| 24.0 | A major flood is in progress. As many as 150 people may evacuate from the western outskirts of Spencer. |
| 23.0 | Flooding affects all homes in Prospect Park area in western Spencer. Evacuations are necessary. Flood water affects southern Spencer and across river in Southport area. Fairgrounds parking lot and arena flood. |
| 22.5 | East side of Cooper Street on Spencer's southside begins to flood. |
| 22.3 | County road south of river gage begins to flood. |
| 22.0 | Some evacuations may begin in Prospect Park area and western outskirts of Spencer. Recreational area on Spencer southwest side is flooded. Flood waters affect the southern part of Freedom. Rural area just north of Freedom extensively floods. |
| 21.0 | Prospect Park area, western outskirts and East Street begin to flood in Spencer. |
| 20.0 | Hyden Road, Fifth Avenue and west side of Cooper Street on Spencer's southside begins to flood. |
| 19.0 | Road south of river gage begins to flood. Gosport Road closes. Extensive agricultural flooding is in progress. |
| 18.0 | Flooding begins of Owen County Fairgrounds and Cooper Park on southside of Spencer. |
| 17.5 | Lowest portions of Trails 1 and 7 flood in McCormicks State Park. Extensive backwater in Rattlesnake, Fall, McCormicks, Limestone, Big and Bean Blossom Creeks with overflow flooding crops or hay. |
| 17.3 | High water affects of Owen County Fairgrounds parking lot and county roads in the Freedom-Arney area. |
| 17.0 | A few mobile homes located downstream of Spencer are isolated because their driveway lanes flood. County Line Road on northside of river has at 1 foot of water and begins to flood in a second place. Spencer Public Access extensively floods. |
| 16.3 | County line road south of Gosport begins to flood. |
| 16.0 | Flood water affects gravel pit. High water concerns farmers in agricultural season about crops and livestock. Lowest portions of Trails 1 and 7 in McCormicks Creek Park flood. |
| 15.5 | Gosport Road, also known as County Line Road in Owen County begins to flood on northside of river. Romona Road west of Gosport begins to flood. Flooding of low agricultural land is noticeable. |

| Feet | Flood Impacts |
|------|---|
| 14.0 | Lowland flooding begins in the Spencer and Gosport areas. The river begins to backup Rattlesnake, Fall, McCormicks, Limestone, Big and Bean Blossom Creeks. Spencer Public Access site begins to flood. |

Mill Creek near Cataract



Flood Categories (in feet)

| | |
|-----------------------|----|
| Major Flood Stage: | 24 |
| Moderate Flood Stage: | 20 |
| Flood Stage: | 14 |
| Action Stage: | 9 |

| Historical Crests |
|-----------------------------|
| (1) 23.00 ft on 12/30/1990 |
| (2) 22.62 ft on 06/07/2008 |
| (3) 22.58 ft on 06/24/1960 |
| (4) 22.20 ft on 05/09/1961 |
| (5) 22.11 ft on 08/17/1993 |
| (6) 22.06 ft on 03/05/1963 |
| (7) 21.54 ft on 05/24/1968 |
| (8) 21.35 ft on 01/05/1950 |
| (9) 21.12 ft on 11/15/1993 |
| (10) 20.17 ft on 07/14/1979 |
| (11) 19.64 ft on 06/29/1957 |
| (12) 19.42 ft on 01/23/1999 |
| (13) 19.19 ft on 01/30/1969 |
| (14) 19.10 ft on 06/23/1952 |
| (15) 19.08 ft on 11/17/1955 |
| (16) 18.90 ft on 03/15/1978 |
| (17) 18.63 ft on 01/22/1959 |
| (18) 18.12 ft on 05/14/2002 |
| (19) 17.97 ft on 04/21/1964 |
| (20) 17.88 ft on 11/20/1985 |

| Feet | Flood Impacts |
|------|--|
| 22.6 | Owen Park Road just south of North Cataract Road was flooded during June 2008. The road floods at a lower level than this. |
| 12.7 | Mill Creek at bankfull levels. Water near Owen Park Road south of North Cataract Road...but road is clearly open. |